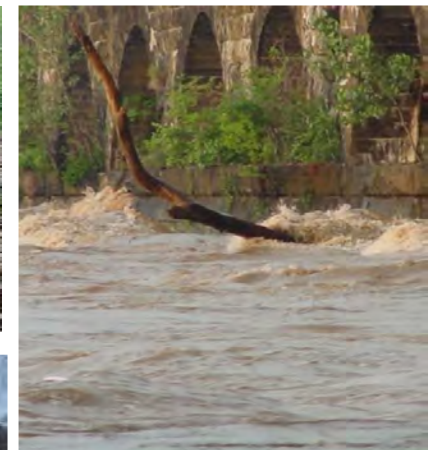
Delaware River Basin Commission

Planning Scenarios for Sea Level Rise Impacts to Drought Management

Amy L. Shallcross, P.E.
Manager, Water Resource Operations

with
Fanghui Chen, Ph.D., P.E.
John Yagecic, P.E.
Namsoo Suk, Ph.D.
Taylor Krolik
Anthony Preucil

Advisory Committee on Climate Change
August 3, 2021



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Objectives

* Inventory sea level rise (SLR) estimates for 2060 and 2100 in the Delaware Estuary using journal articles from major institutions. (NOAA, IPCC, USACE, Rutgers, others)
* Choose a range of SLR for drought and flow management planning projects
* Estimate impacts to the saltwater freshwater / interface (the salt front) during average and drought periods using SLR estimates
* Discuss choice of projections with the Advisory Committee on Climate Change

Salt Front Location: August 2, 2021

Normal August Location: RM 74

8/2/2021 Location: RM 66.3

Salt front not tracked below RM 54.

Median Monthly Salt Front Locations

January	69
February	71
March	70
April	67
May	68
June	69
July	70
August	74
September	76
October	72
November	70
December	69

Proposed Modeling Assumptions

* Literature Review
  * STAP2016 – Probabilistic/Generic scenario based
  * DNREC 2017 - (University of Delaware) – RCP8.5
  * NOAA 2017 – Probabilistic Monte Carlo
  * USACE 2014 – Historic plus semi-empirical based on temperature
  * STAP 2019 (Rutgers) – Probabilistic/RCP-based/New Ice Melting Accounting
* Relative to Year 2000 (Baseline)
* Representative

Proposed Sea Level Rise Projections for Modeling Salinity							
Meters	0	0.3	0.5	0.8	1.0	1.6	2.0
Feet	0	1	1.6	2.6	3.28	5.3	6.56

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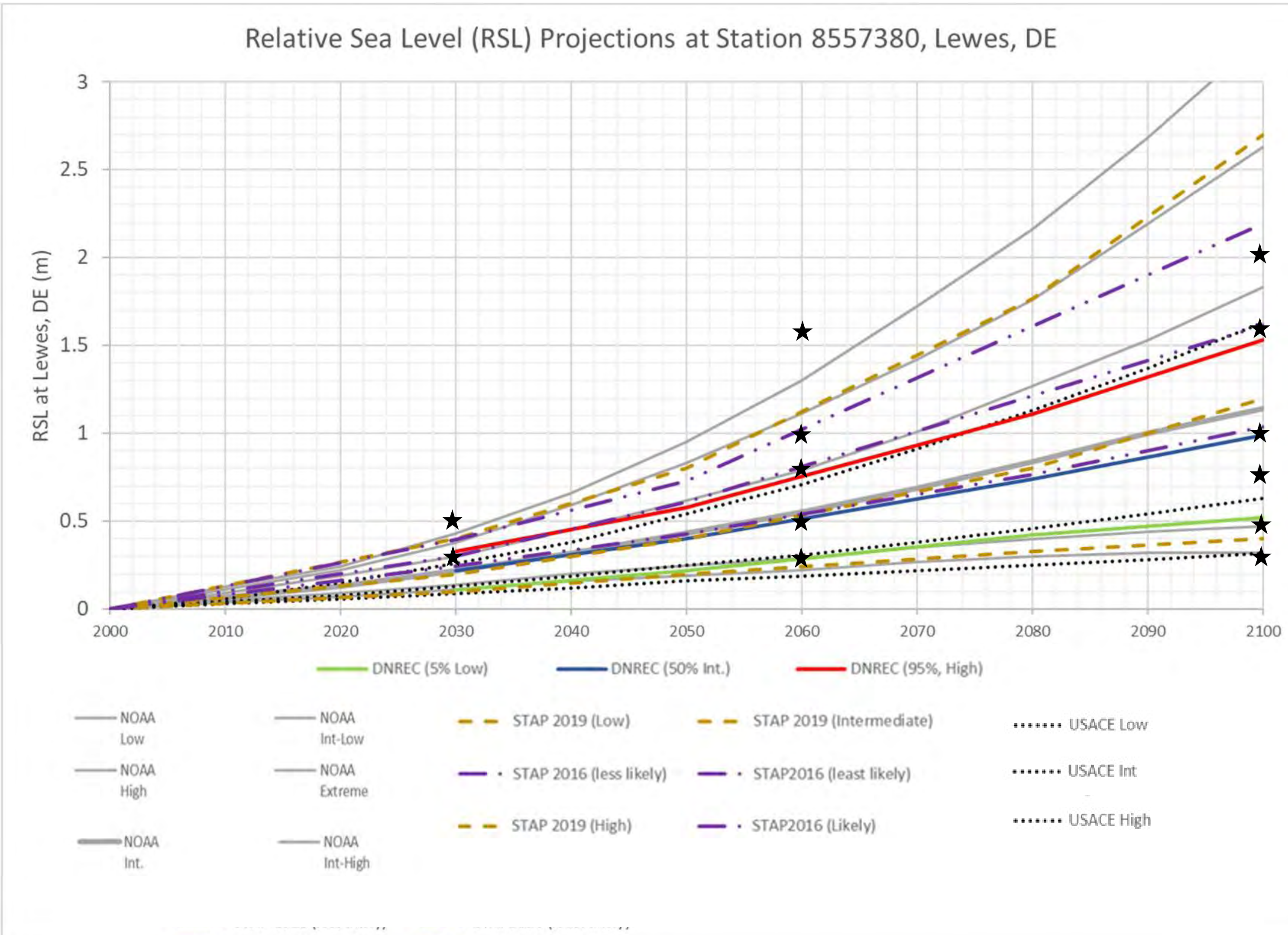
Relative Sea Level (RSL) Projections at Station 8557380, Lewes, DE
RSL at Lewes, DE (m)
0
0.5
1
1.5
2
2.5
3
2000
2010
2020
2030
2040
2050
2060
2070
2080
2090
2100
DNREC (5% Low)
DNREC (50% Int.)
DNREC (95%, High)
NOAA Low
NOAA Int-Low
STAP 2019 (Low)
STAP 2019 (Intermediate)
USACE Low
NOAA High
NOAA Extreme
STAP 2016 (less likely)
STAP2016 (least likely)
USACE Int
STAP 2019 (High)
STAP2016 (Likely)
USACE High
NOAA Int.
NOAA Int-High

Proposed Sea Level Rise Planning and Modeling Scenarios

SLR Scenario	Scenario Planning Years			Description/Representation
	2030	2060	2100	
0.3 m (1 ft)	X	X	X	**Near-term adaptation planning for risk adverse infrastructure.** For the high emission scenario, 0.3 m (1 ft) represents a value that has a high probability of being exceeded **by 2030** (irrespective of emission scenario) *{95% probability for 2030}*
0.5 m (1.6 ft)	X	X	X	**Medium range planning.** For the high emission scenario, 0.5 m (1.6 ft) represents a value that is likely to be exceeded **in 2060** (low and medium emission scenarios) and extremely likely to be exceeded in 2100. *{likely by 2050 (2060)}*
0.8 m (2.6 ft)		X	X	**Medium range planning for risk-adverse infrastructure.** For the high emission scenario, 0.8 m (2.6 ft) has a low probability of being exceeded by **2060** and will likely be exceeded by 2100 *{possible, but extremely unlikely by 2060}*
1.0 m (3.3 ft)		X	X	**Long-range planning.** For the high emission scenario, 1.0 m (3.3 ft) has a low probability of being exceeded by 2075 and is likely to be exceeded by 2100. *{high end of the likely range by 2100 for low emission}*
1.6 m (5.3 ft)		X	X	**Long-range planning for risk-adverse infrastructure.** For the high emission scenario, 1.6 m (5.3 ft) has a low probability of being exceeded by **2100**. *{5% probability by 2100}*
2.0 m (6.6 ft)			X	**Conservative long-range planning for risk-adverse infrastructure.** For the high emission scenario, 2.0 m (6.6 ft) is unlikely to be exceeded by **2100**. *{<1% probability by 2100}*

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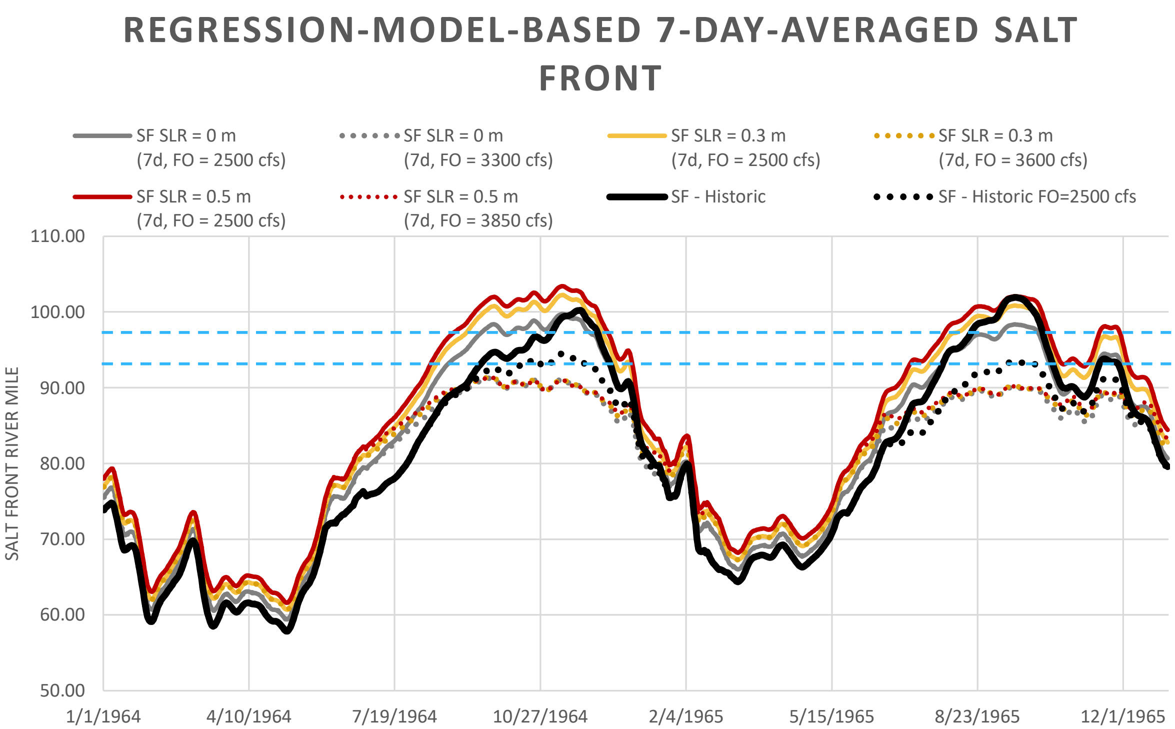
Possible Flow Requirements



Sea Level Rise	Possible Flow Objective (cfs) for Salt Front Below Schuylkill River 92.5
Historic	2500 – 3000
0 m	3300
0.3	3600
0.5	3850
1.0	4600
1.6	5100

Based on EFDC-lite. Flow Objective determined by raising any flow below a certain value.

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Questions for AC3

* Is a lower bound of 0.3 m (1 ft), which is “likely” to happen by 2060 low enough considering adaptation strategy implementation lead times? If not, why?
* Would you eliminate any of the values? If so, why?
* Are three intermediate SLR values enough? If not, why?
* Is the upper bound of 1.6 m (5.3 ft) high enough considering the “likelihood” of much higher values occurring before 2100 is small? What would be the advantage of adding a higher projection?
* Have you used SLR projections for purposes other than flood-related protection? If so, in what context?
* What other expressions of risk can be used to provide additional context for decision makers?