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Flood Damage and Cost Avoidance Analysis for Community Resilience

Daniel Bourdeau, PE, CPSWQ, CPESC, Geosyntec
Dr. Cameron Wake, PhD, University of New Hampshire

Geosyntec consultants

Acknowledgement

This study was funded by:

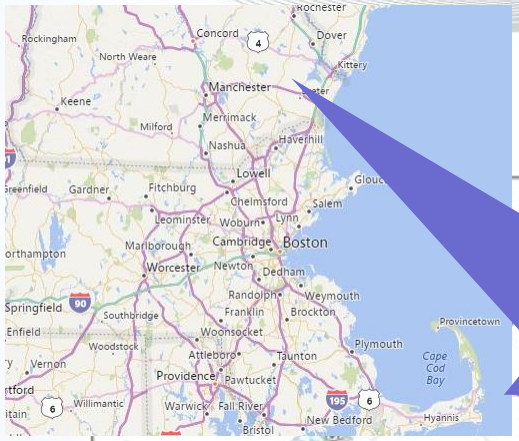
University of New Hampshire

Sea Grant New Hampshire

Study conducted in cooperation with:

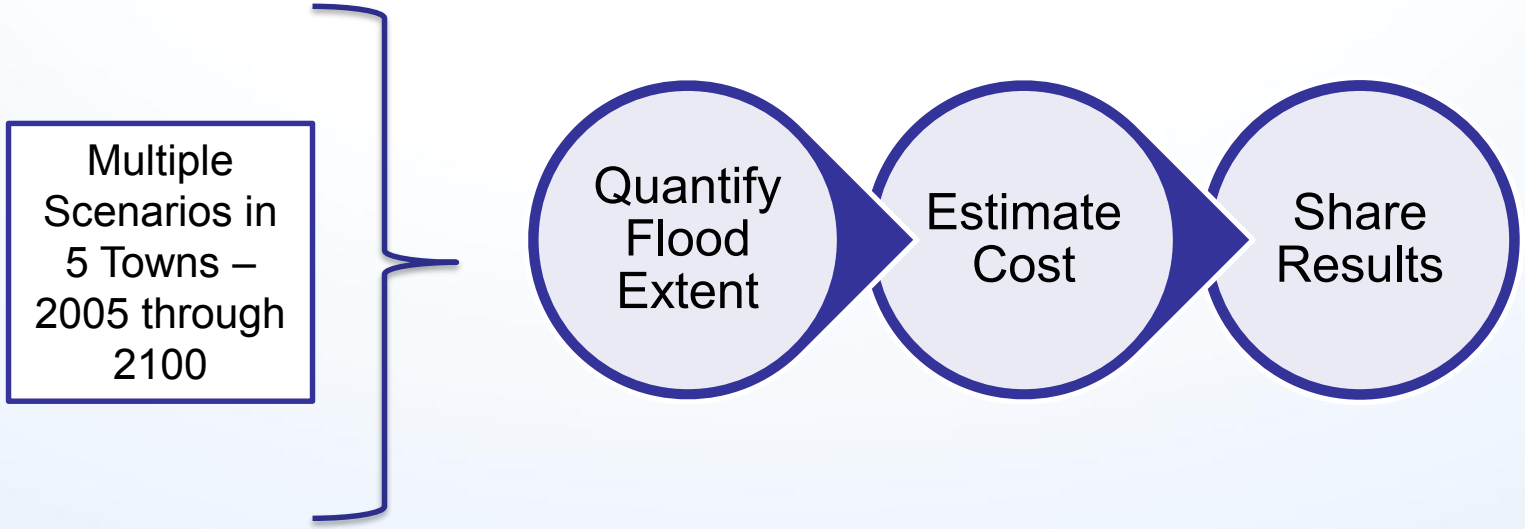
University of New Hampshire

Project Location



Study Objectives

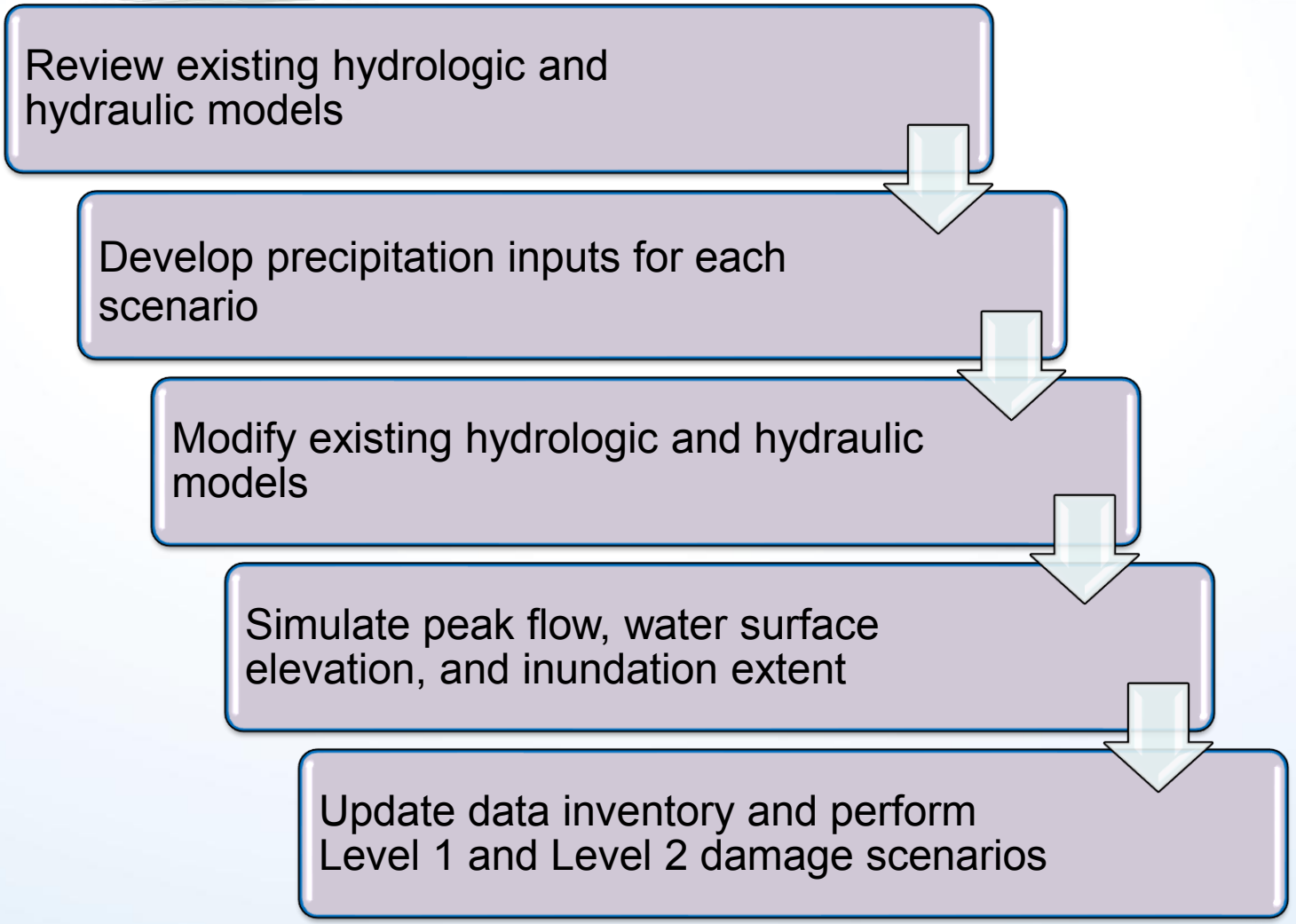
- ✓ **Objective 1:** Estimate flood damage and cost due to changes in land use and climate.
- ✓ **Objective 2:** Share findings with communities and stakeholders



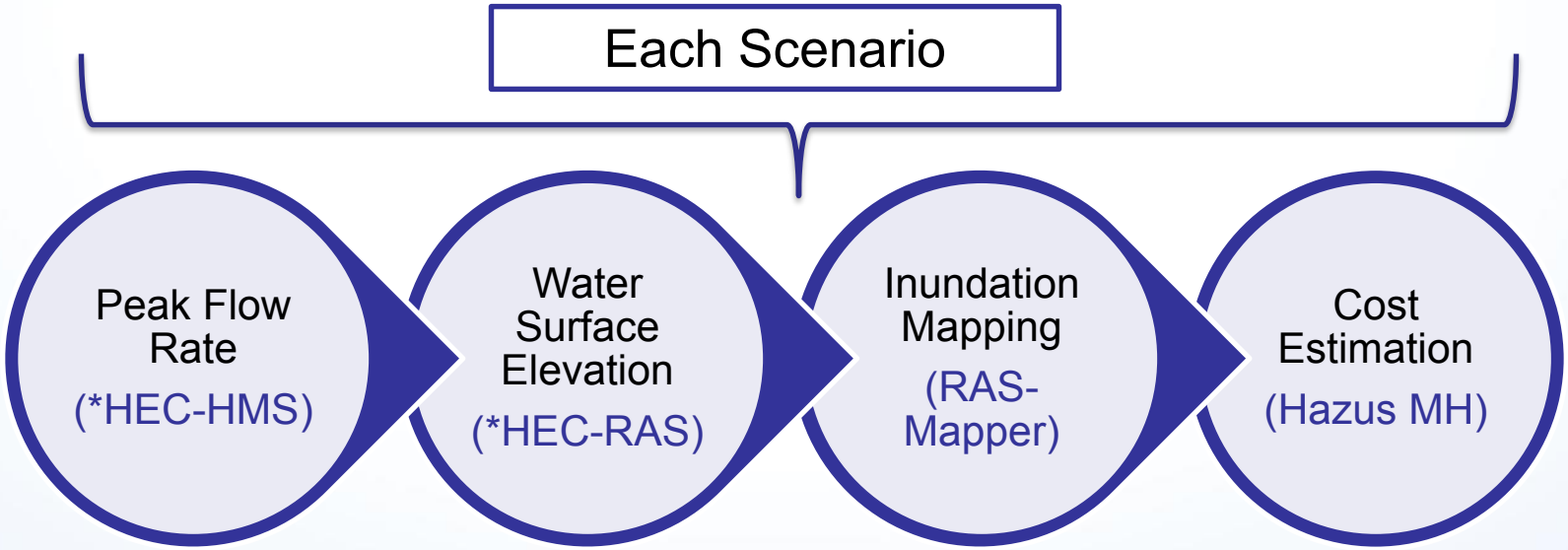
Scenarios

Scenario Year	Return Period	Climate profile
2005	5-, 10-, 25-, 50-, 100-yr	Current
2050	5-, 10-, 25-, 50-, 100-yr	Future
2100	5-, 10-, 25-, 50-, 100-yr	Future

Methodology



Modeling Methods

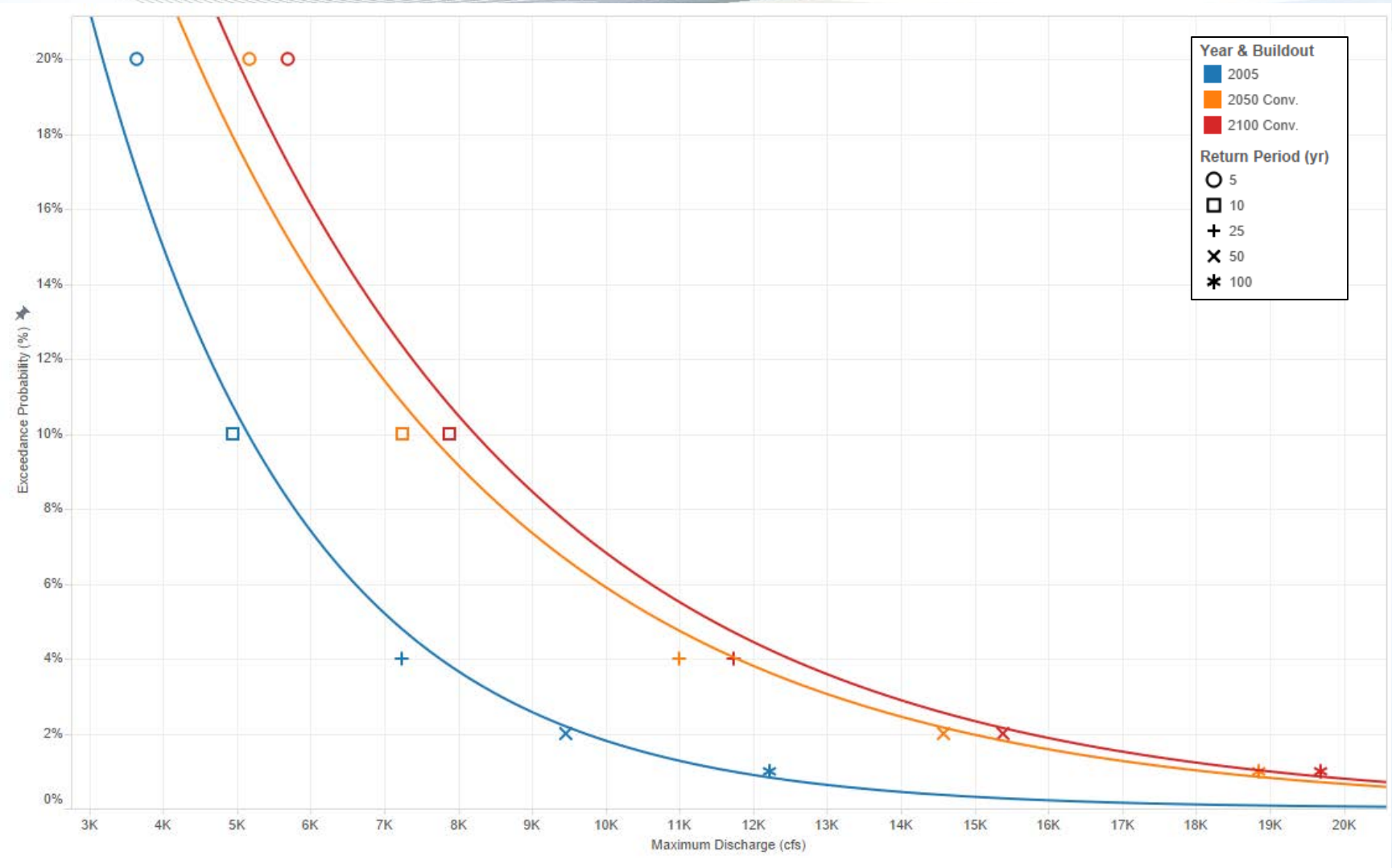


*HEC-HMS & RAS models developed by UNH

Rainfall Depth

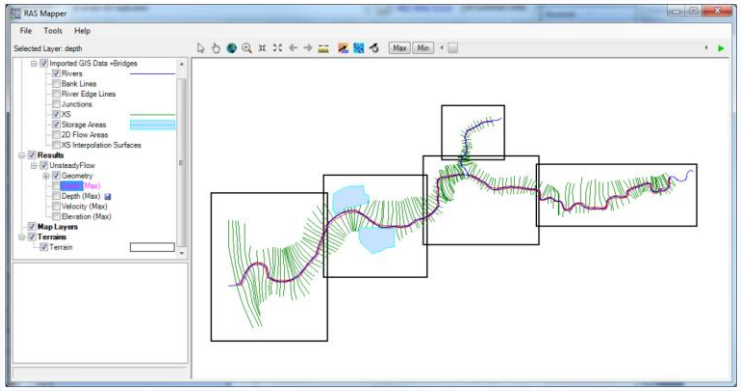
Return period	Current Depth (in)	Future Depth (in)
5-yr	3.9	4.5
10-yr	4.7	5.6
25-yr	6	7.5
50-yr	7.1	9.3
100-yr	8.5	11.5

Maximum Discharges at XS10



Inundation Mapping

- RAS Mapper
- Inundation Raster
  - Maps generated for all scenarios
  - Geospatially referenced
  - DEM derived from 2m LIDAR Data



Loss Estimation – Hazus MH

- What is Hazus?

Calculates Economic Loss from Physical Damage

Nationally Applicable Standardized Methodology

- Levels of Analysis

Level 1 – Simplest Analysis

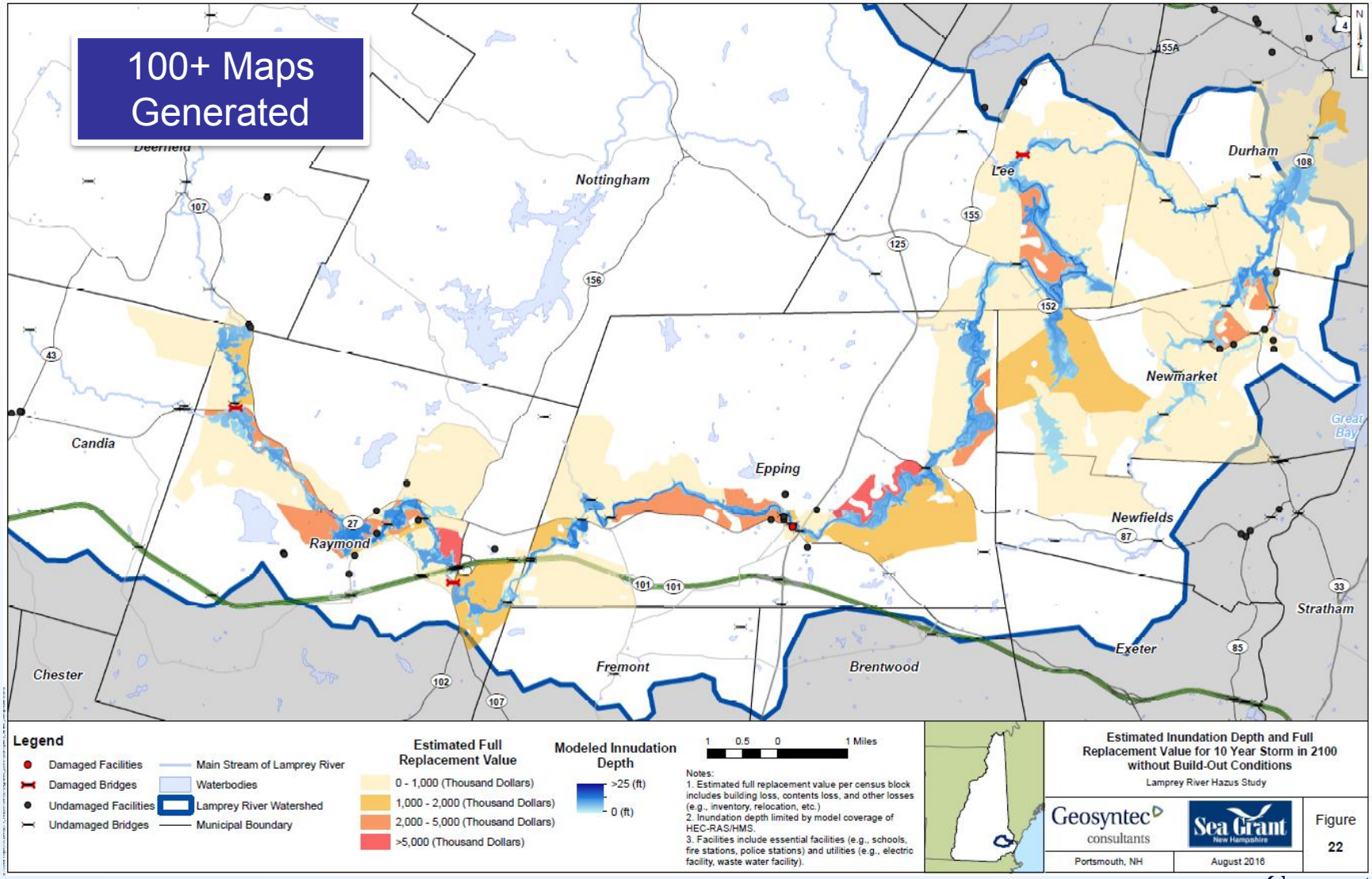
Built in Hydrologic Model

Levels 2&3 – More Complex

External Flood Data

Hazards U.S. – Multi Hazard, Developed by FEMA

Study Results – Static



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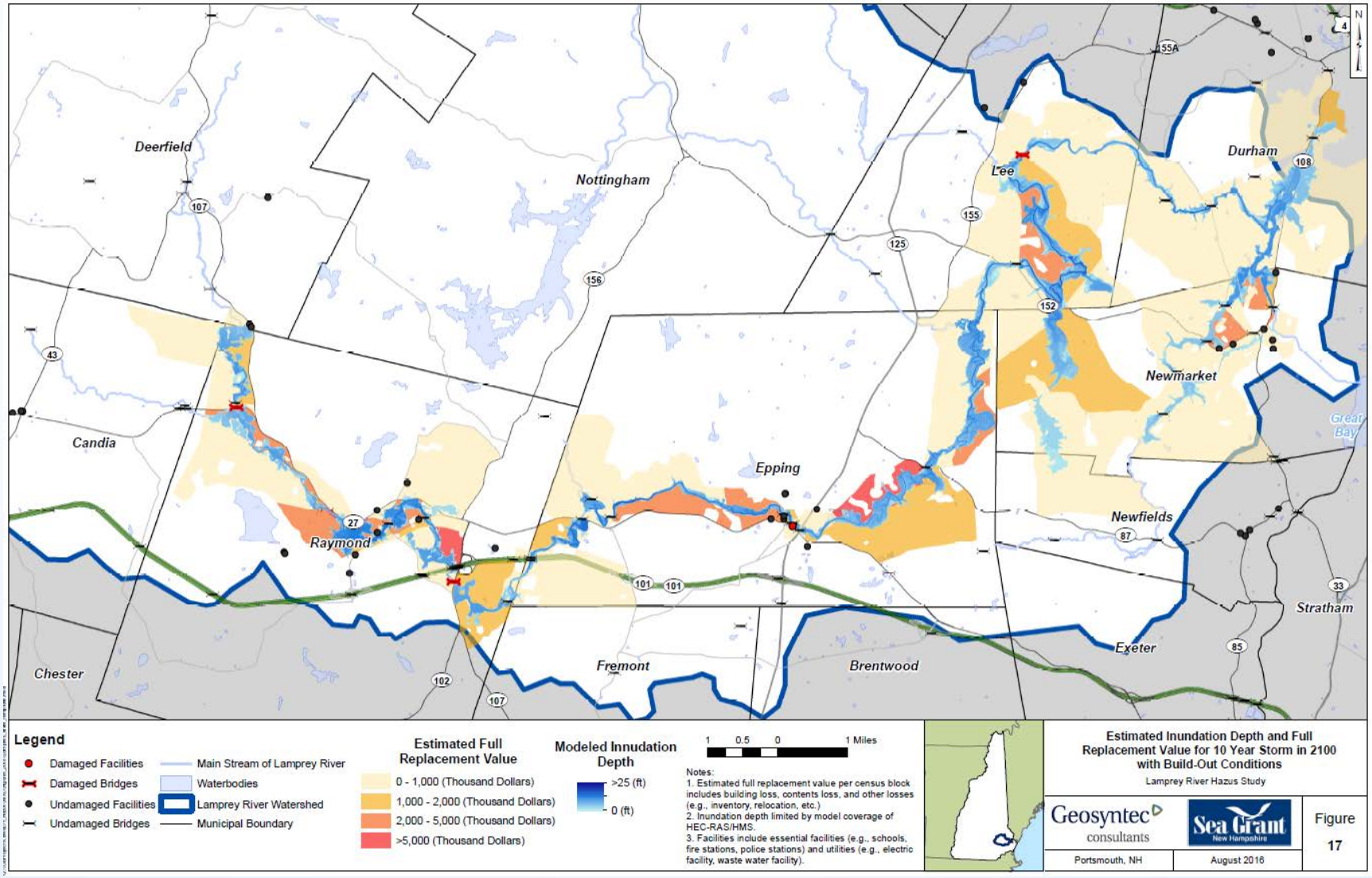

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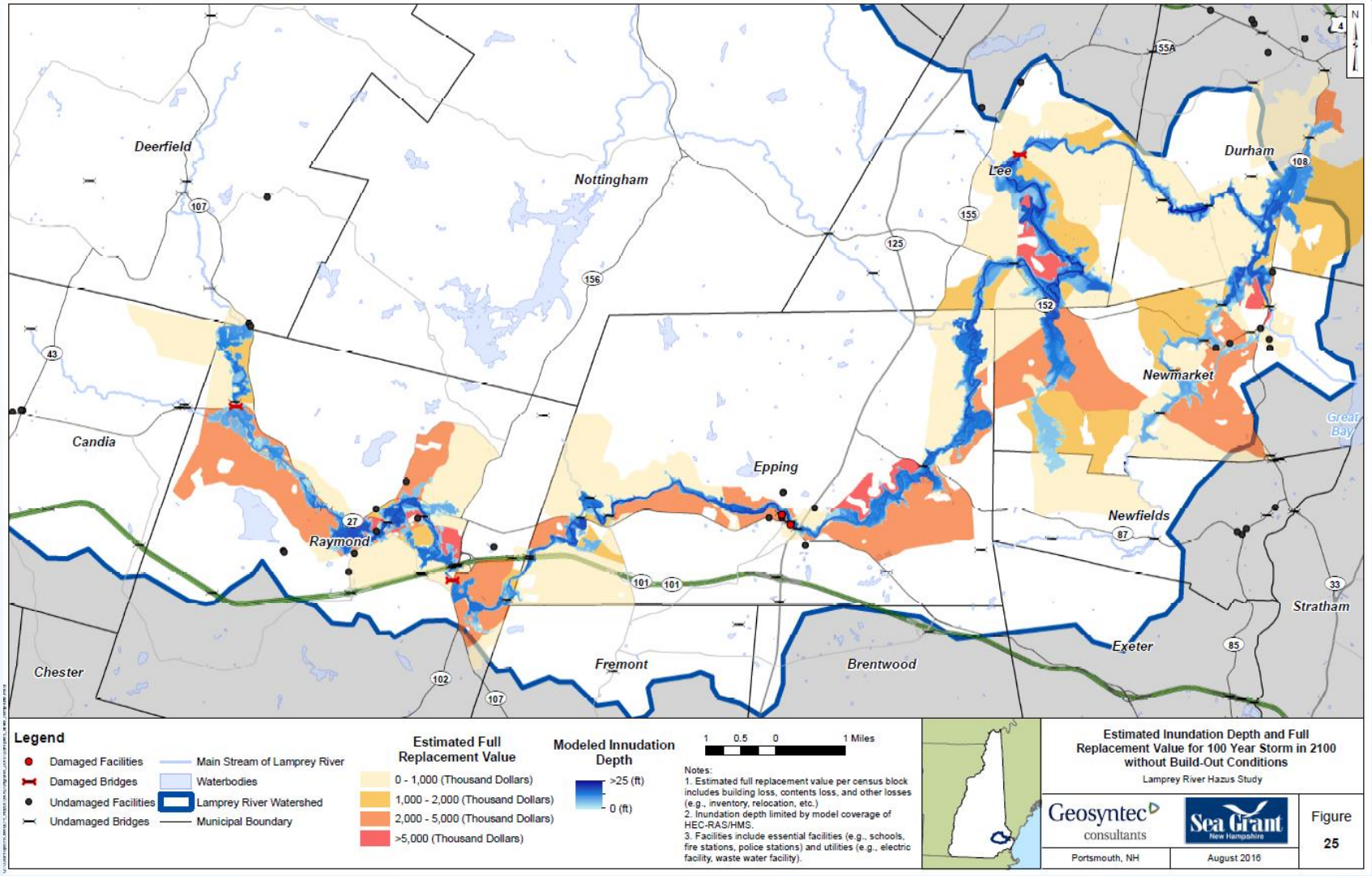

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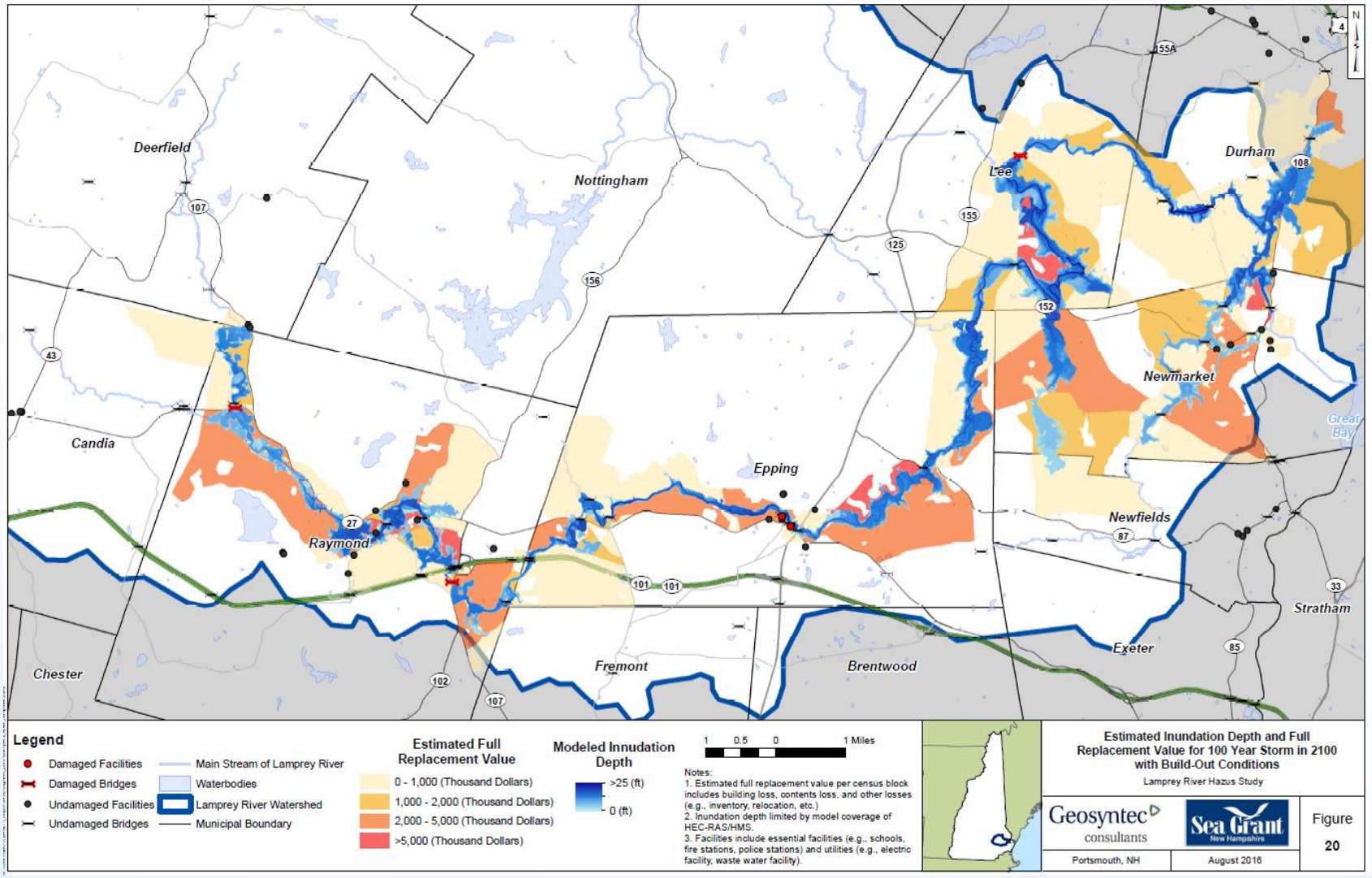

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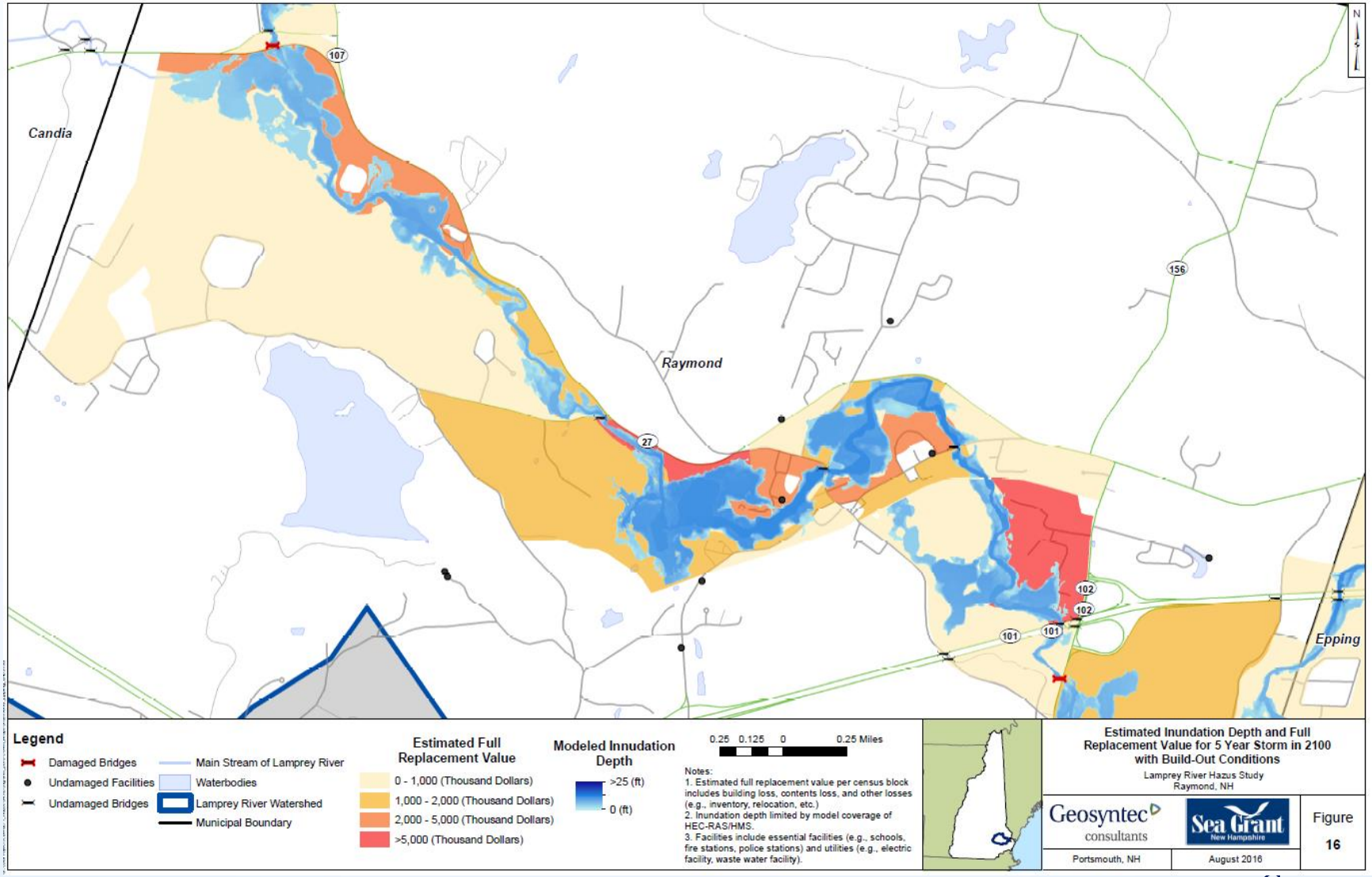

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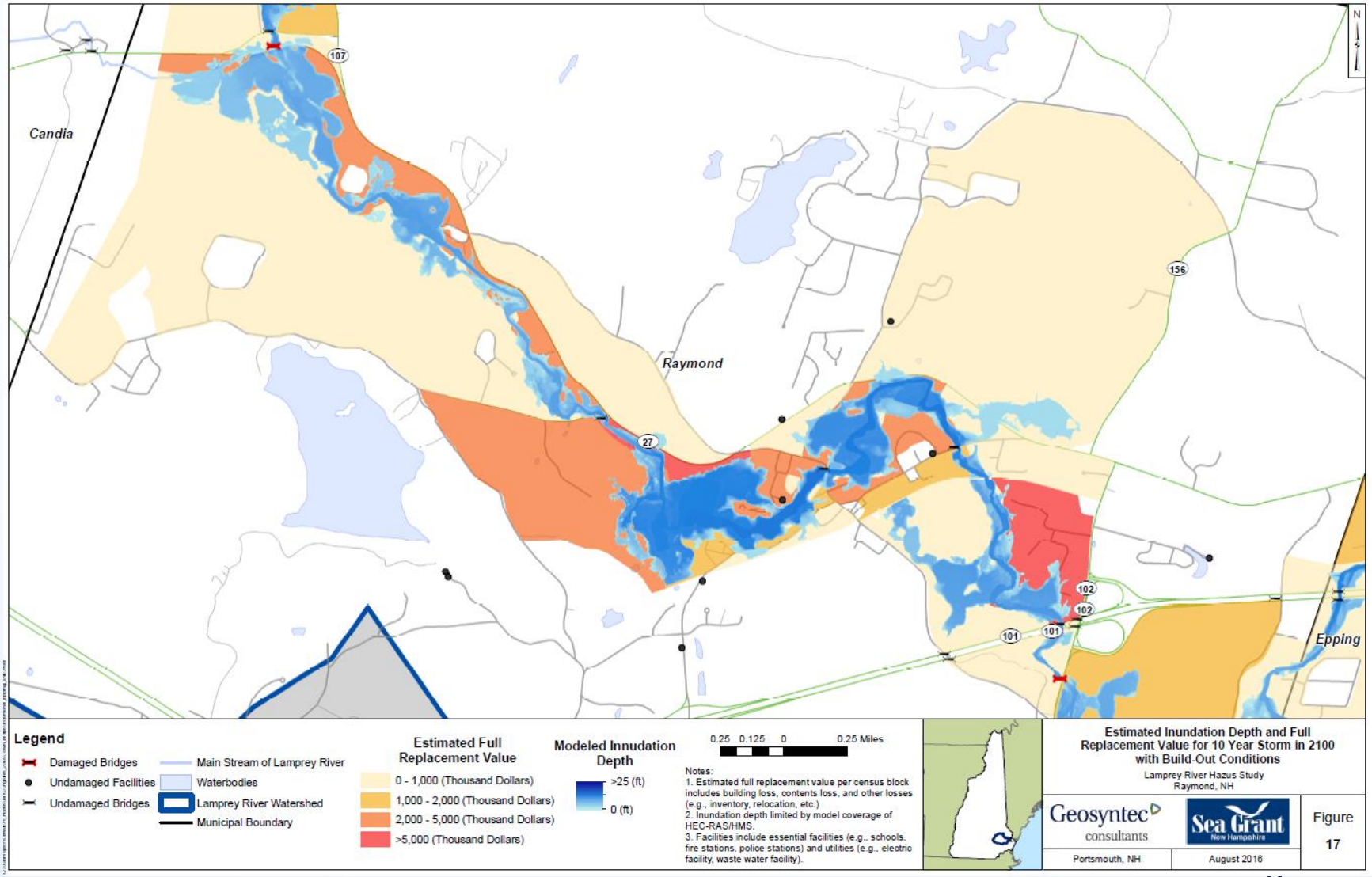

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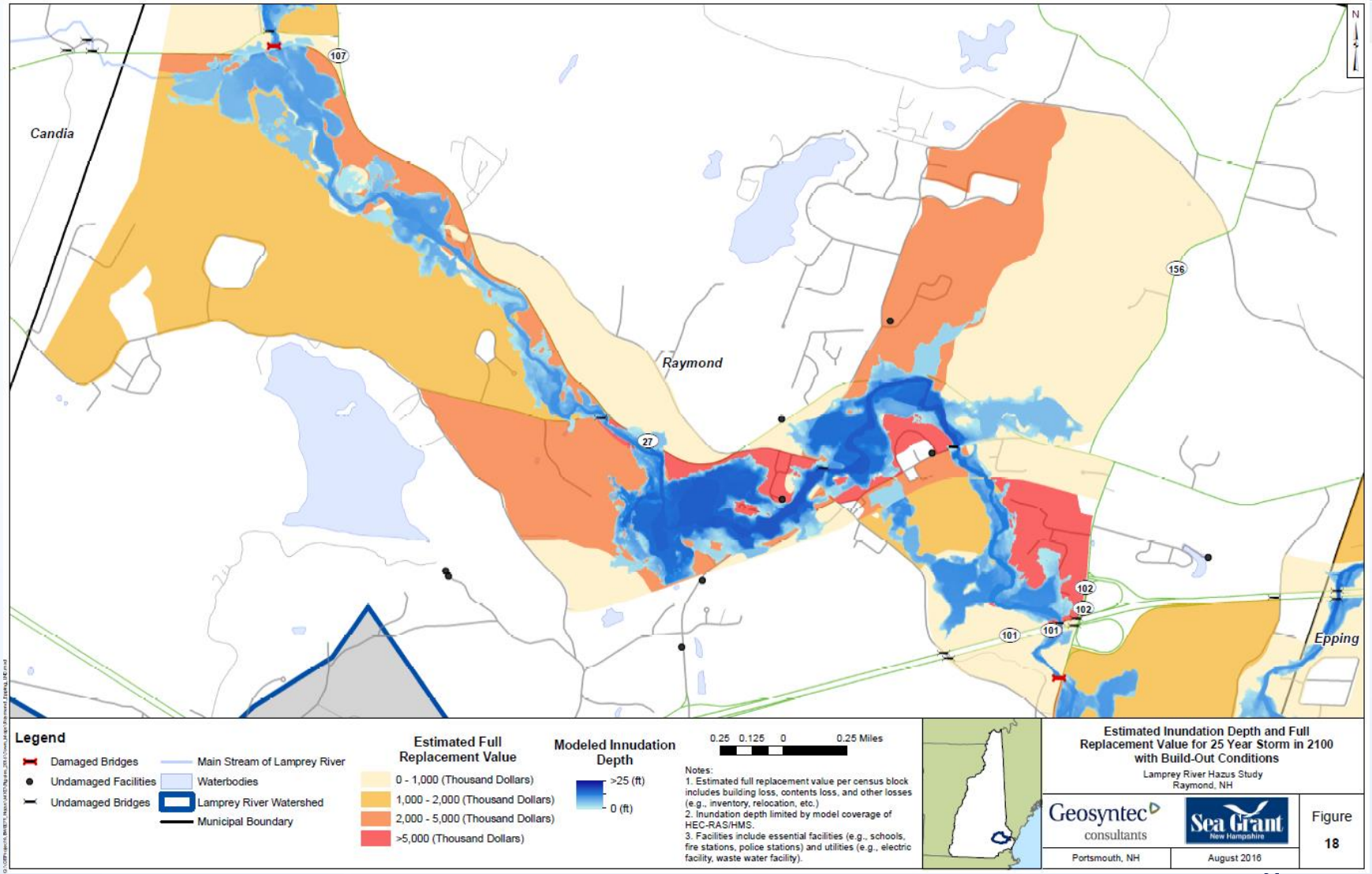

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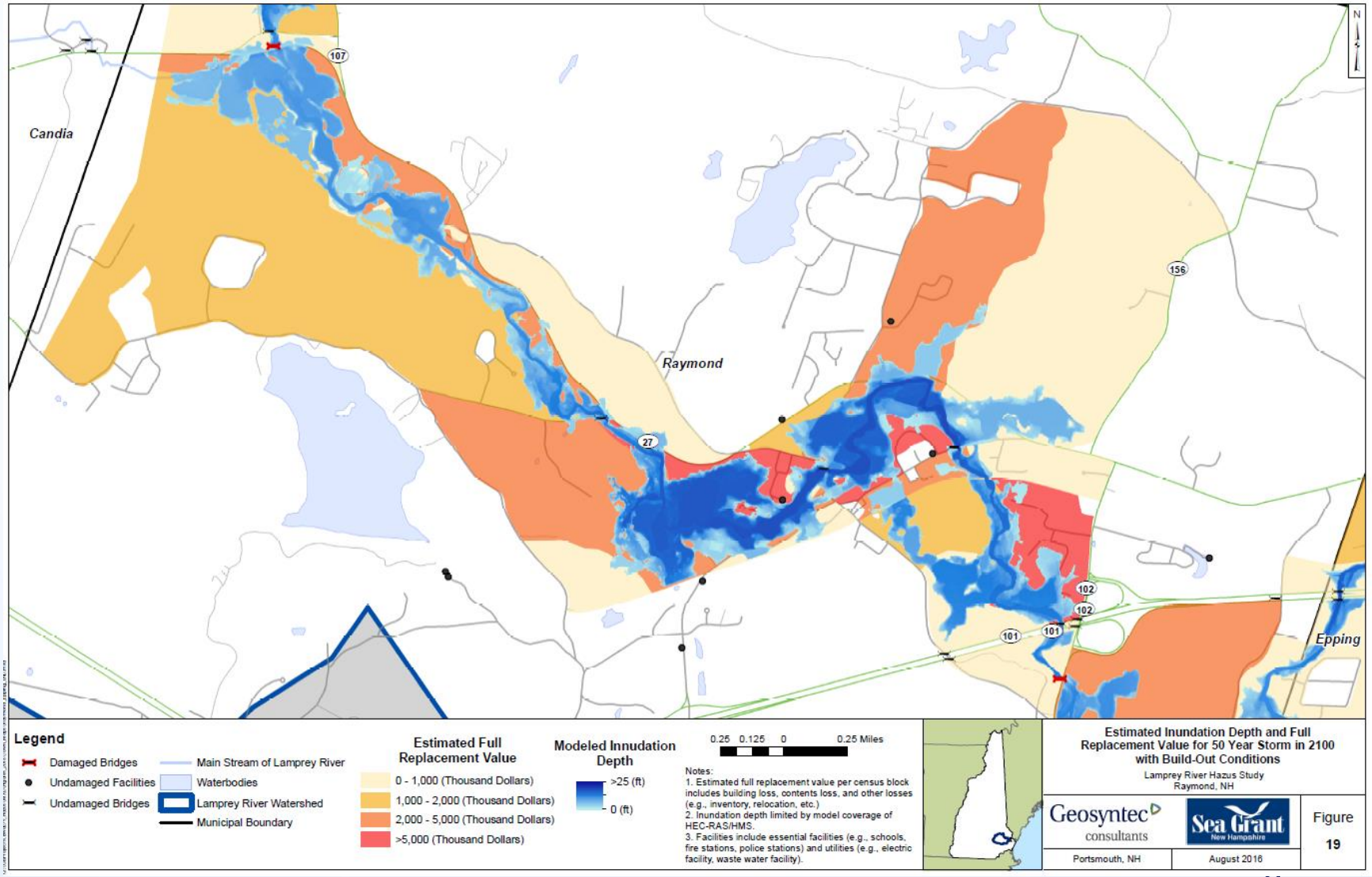

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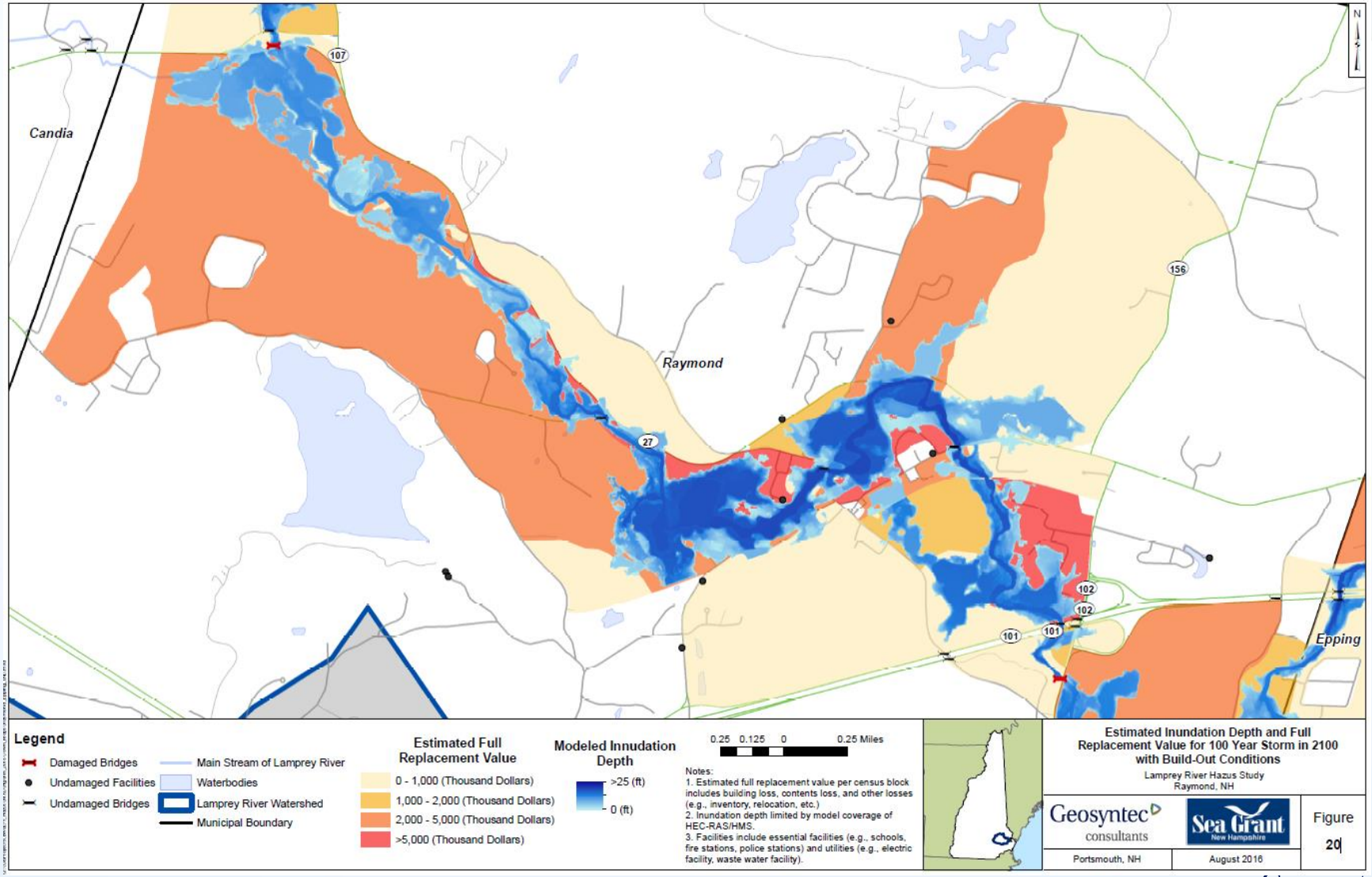

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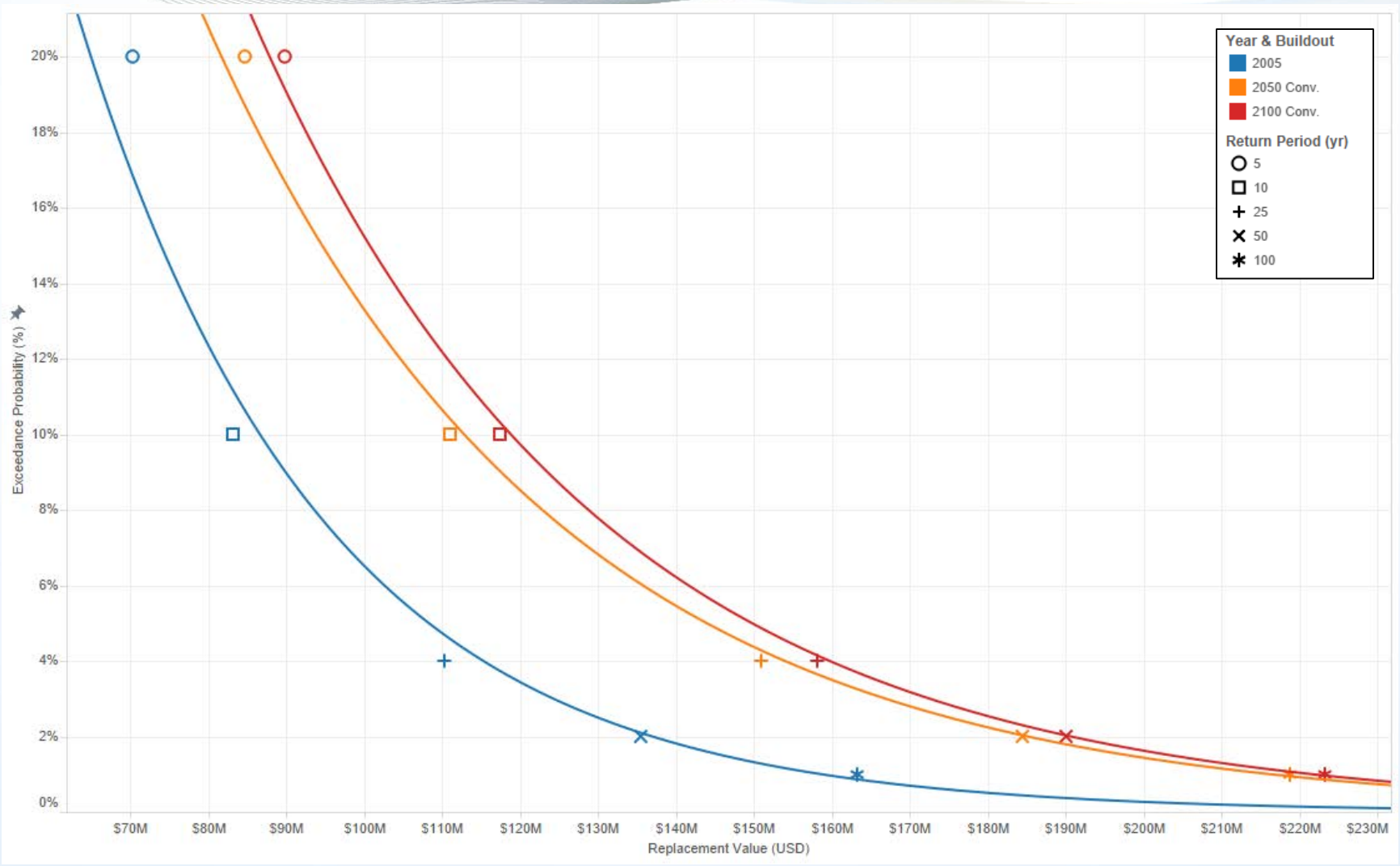
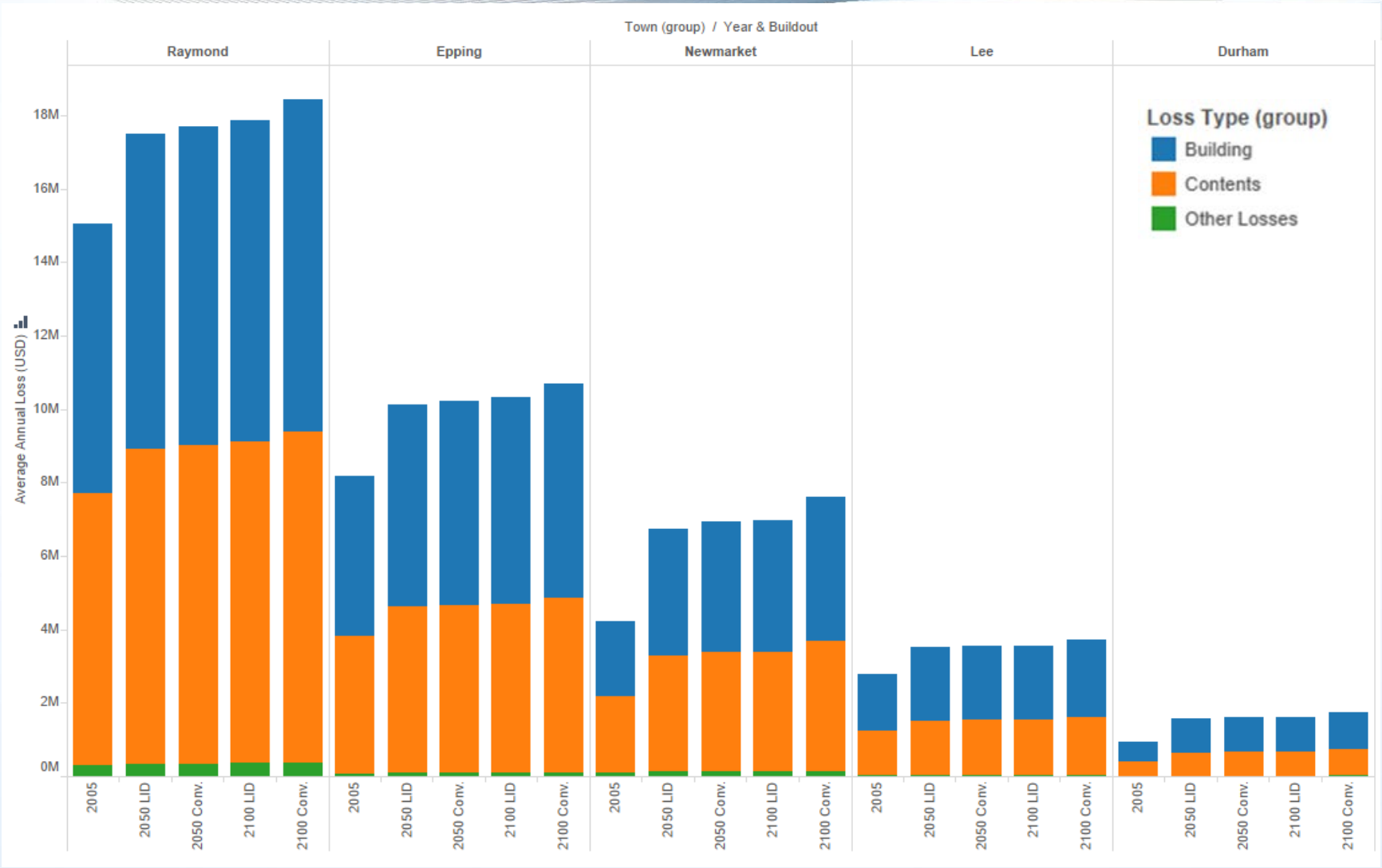
Full Replacement Cost (All Towns)



Inundation Area by Town

Return Period	Time Period	Buildout	Inundation Area (Square Miles)						
			Epping	Raymond	Newmarket	Lee	Durham	Other Towns	Total
100-yr	2100	Conv.	1.68	1.72	1.21	1.47	0.99	0.08	7.14
	2050	Conv.	1.68	1.70	1.20	1.45	0.98	0.08	7.08
	2005	N/A	1.48	1.54	1.06	1.24	0.88	0.07	6.27
50-yr	2100	Conv.	1.55	1.67	1.14	1.38	0.94	0.07	6.75
	2050	Conv.	1.53	1.59	1.13	1.36	0.94	0.07	6.61
	2005	N/A	1.41	1.42	0.99	1.09	0.82	0.07	5.80
25-yr	2100	Conv.	1.46	1.51	1.06	1.19	0.87	0.07	6.15
	2050	Conv.	1.44	1.48	1.04	1.16	0.85	0.07	6.05
	2005	N/A	1.36	1.28	0.91	0.98	0.76	0.06	5.36
10-yr	2100	Conv.	1.37	1.30	0.95	1.00	0.78	0.06	5.46
	2050	Conv.	1.36	1.27	0.93	0.97	0.76	0.06	5.35
	2005	N/A	1.40	1.11	0.80	0.85	0.69	0.06	4.90
5-yr	2100	Conv.	1.43	1.13	0.86	0.87	0.71	0.06	5.06
	2050	Conv.	1.41	1.11	0.84	0.85	0.69	0.06	4.95
	2005	N/A	1.34	1.05	0.74	0.75	0.61	0.05	4.53

Study Results – Avg. Annual Losses



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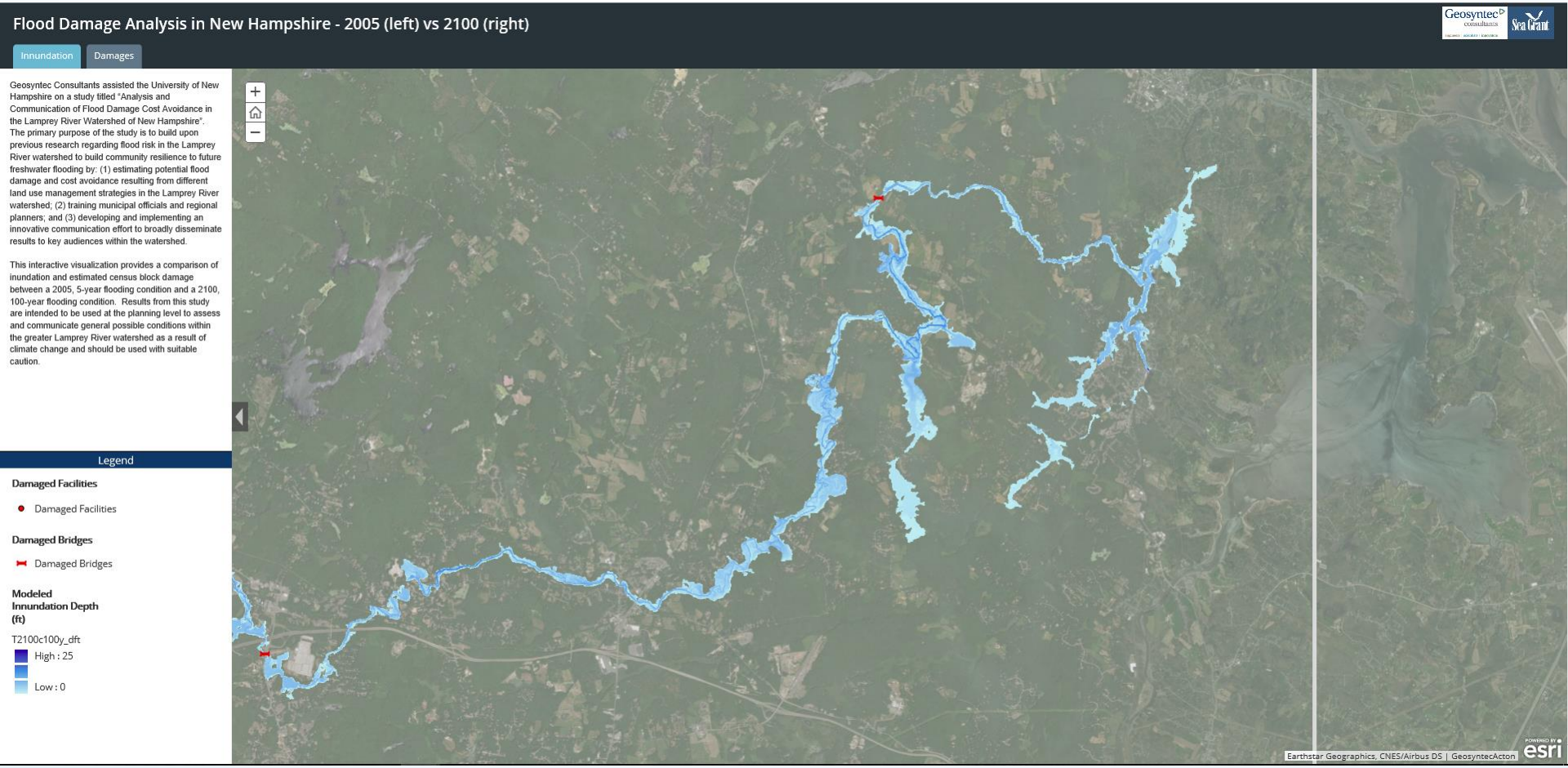
Study Results - Interactive

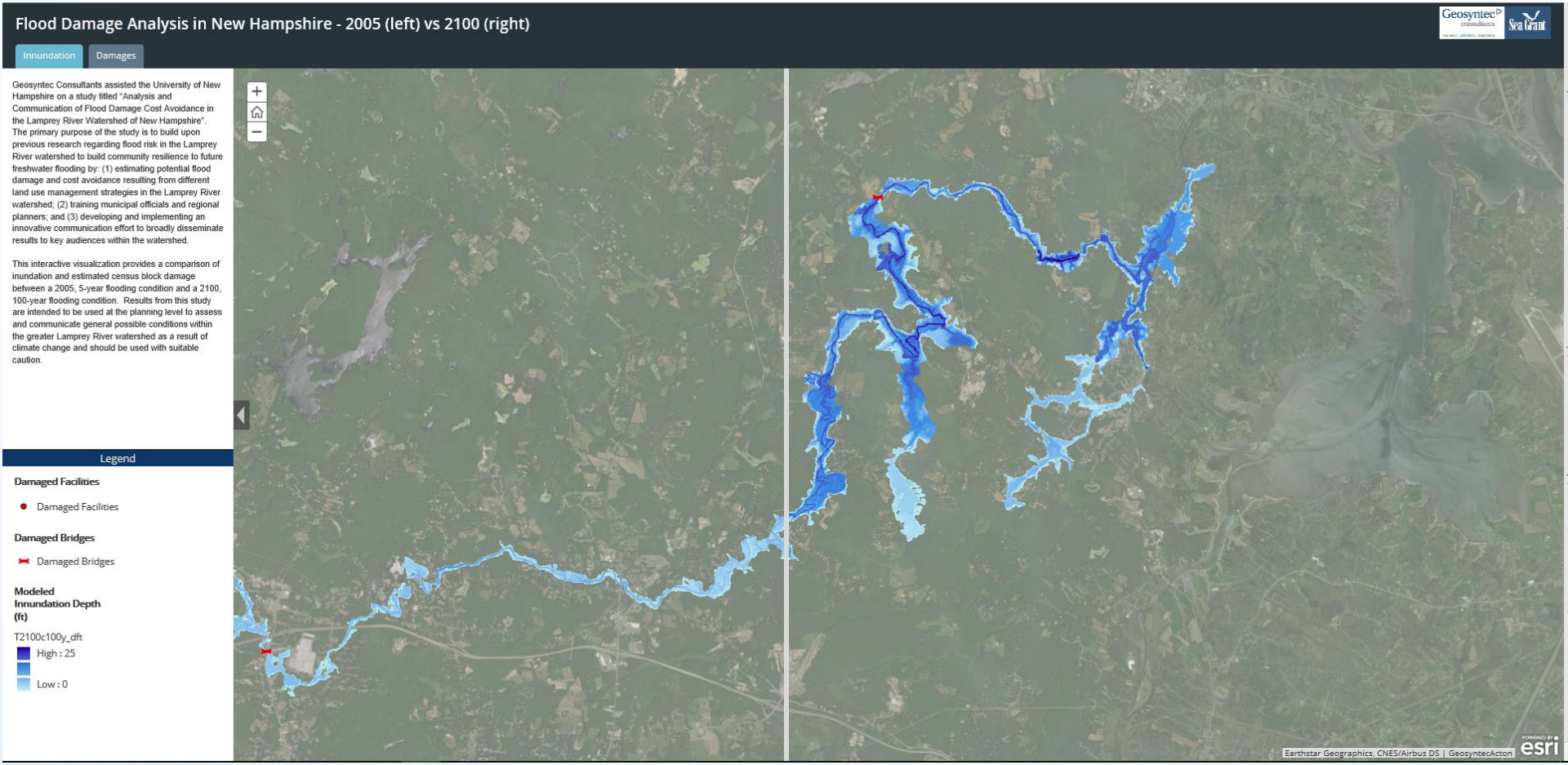
ArcGIS Story Maps

- Interactively communicate complex project findings to clients
- http://arcg.is/2en4DUK

Inundation Study Results - Interactive



Inundation Study Results - Interactive



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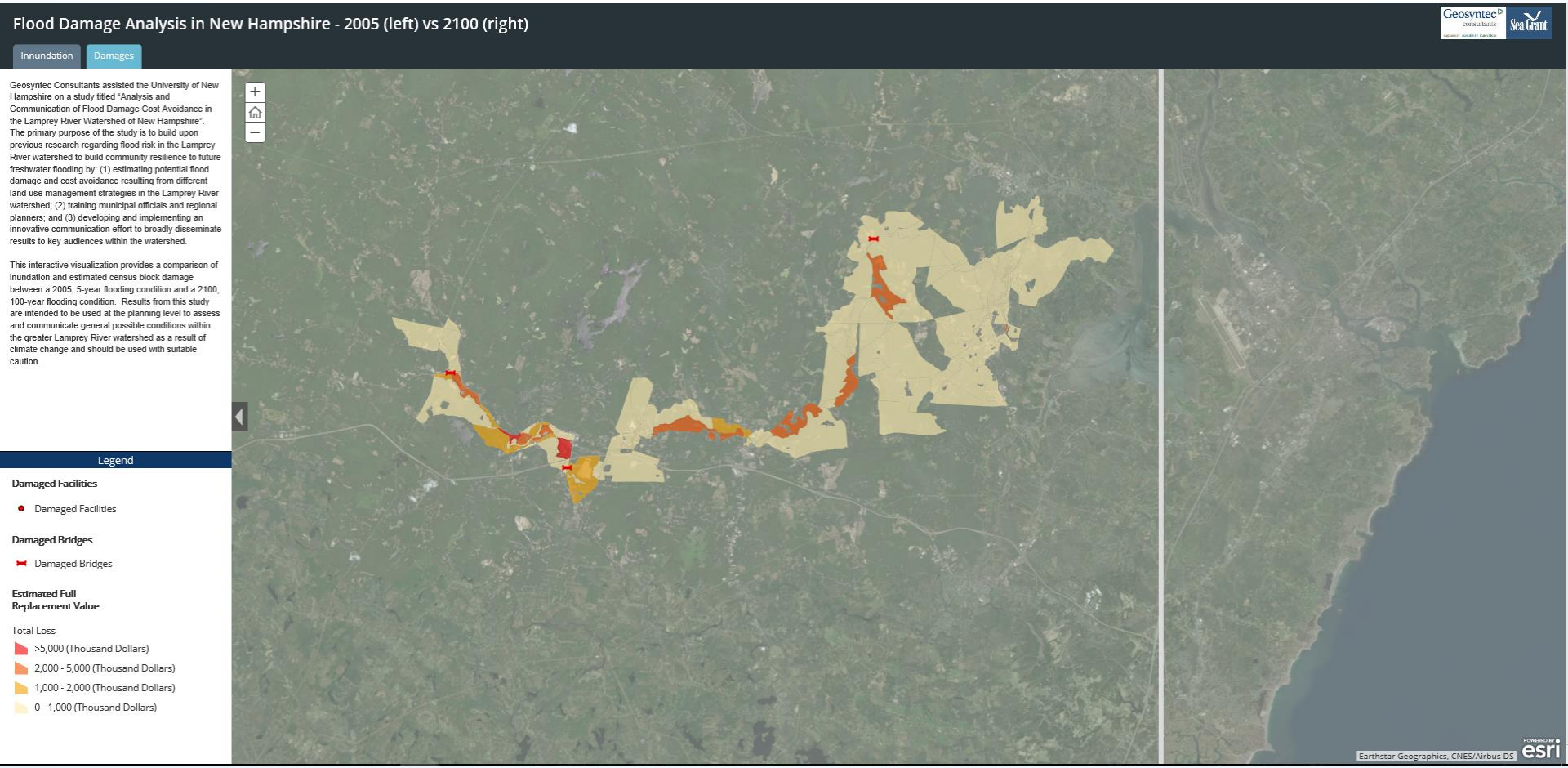

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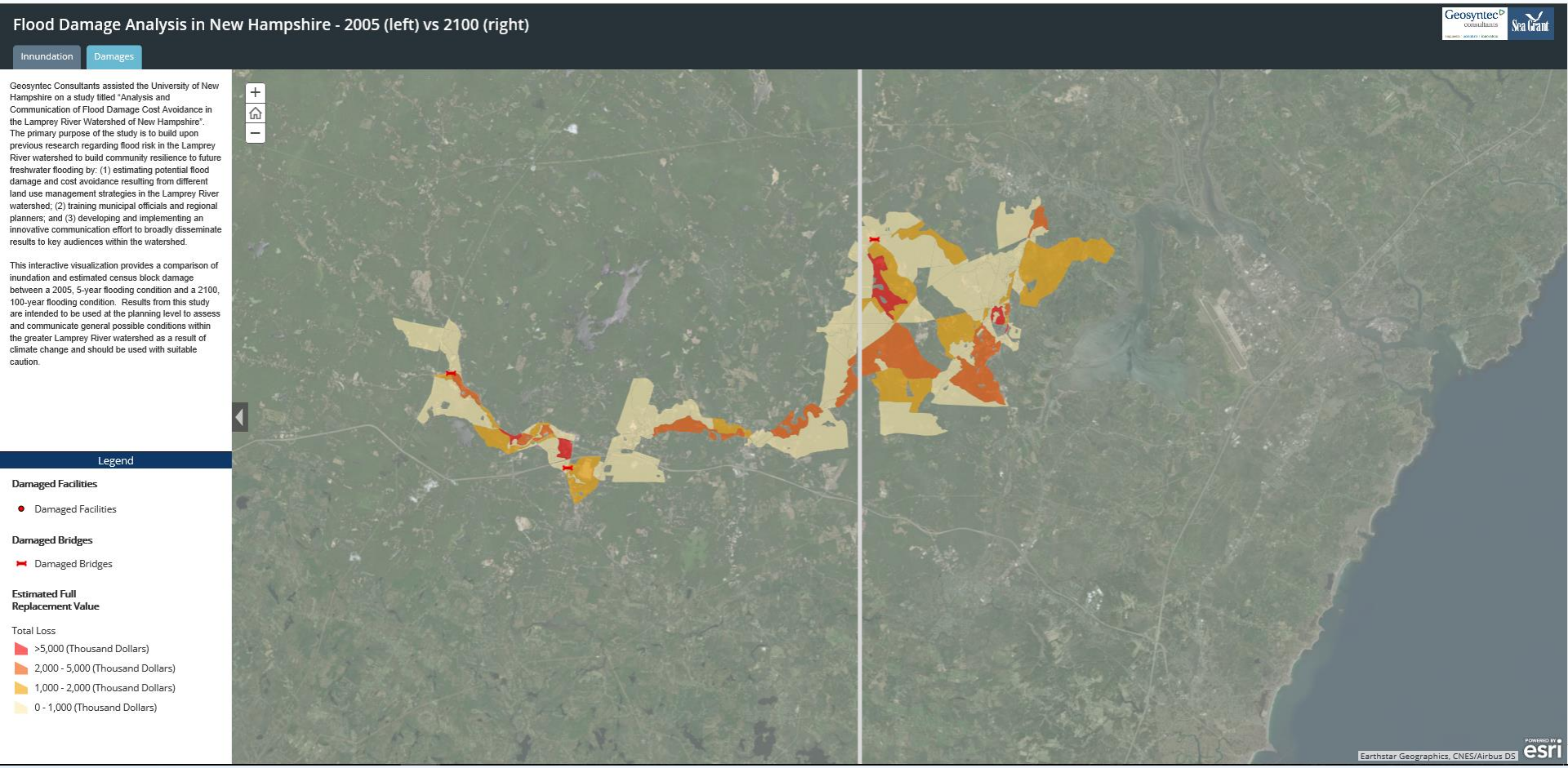

Costs Avoided - Town of Lee, NH

- Expand this work toward costs avoided analysis
- Create inundation maps for Lamprey River and tributaries
- 100-Yr floodplain in 2050, built-out conditions
- Amend Lee ordinance/requirements
- Restrict development within the 2050 floodplain
- Future additional development avoided
- Costs of damages are avoided

The End

Thank you!

Daniel Bourdeau, PE, CPESC, CPSWQ, Geosyntec

DBourdeau@Geosyntec.com

508-472-9538

Dr. Cameron Wake, University of New Hampshire

cameron.wake@unh.edu