TRAPPD:
Incorporating Risk Assessment into Asset Management

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MaineDOT Environmental Office

Staying Above High Water
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What is at risk?

Home
Nature
Recreation
Travel
Work
Family
Places
What are we worried about?

- Change
- Rigidity
- Rogue thinking
- Mass thinking
- Not enough
- Too much
- ...

Integrity - Competence - Service
How risky is our business?

• What do we need to worry about?

• What is the size of the problem?

• Is there a design ‘sweet spot’ we can tolerate?

• Is it reasonable to apply BCA to every asset?

• Can we say for sure that we’ll be better off?
How big is the problem?

What about storm surge?

- 4,105 Bridges/Facilities
- 1,711 Large Culverts
- 136 Bridges/facilities
- 30 Large Culverts

Zero score on SLR indicator
Is there a “sweet spot” where useful and meaningful meet?

- Science-based
- Current
- Useful
- Universal
- Tolerable
- Translatable
Translating uncertainty to outcomes...

- Project delivery schedules
- Estimated project budget
<table>
<thead>
<tr>
<th>Grant Year</th>
<th>Source/Title</th>
<th>Focus</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>FHWA Climate Vulnerability</td>
<td>Benefit-cost for SLR/SS scenarios</td>
<td>Asset-specific BCA method</td>
</tr>
<tr>
<td>2013</td>
<td>SHRP2/NAS Eco-Logical</td>
<td>Landscape-level analysis</td>
<td>100-year culvert sizing</td>
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<tr>
<td>2016</td>
<td>FHWA Coastal Resiliency</td>
<td>Asset exposure to SLR/SS</td>
<td>Identified coastal assets at risk</td>
</tr>
<tr>
<td>2016</td>
<td>STIC Planning &amp; Environmental Linkages</td>
<td>Incorporate risk into asset management</td>
<td>Early decision support tool</td>
</tr>
<tr>
<td>2017</td>
<td>FHWA Green Infrastructure for Coastal Highway Resilience</td>
<td>Applicability</td>
<td>Limitations</td>
</tr>
<tr>
<td>2017</td>
<td>FHWA Asset-based Risk Assessment</td>
<td>Institutionalize early risk assessment</td>
<td>TRAPPD</td>
</tr>
</tbody>
</table>
What is TRAPPD?

Transportation Risk Assessment for Planning and Project Delivery
Headliners versus Understudies: Proxy Indicators

1. Is the drainage area part of a priority Atlantic salmon watershed?
2. Is the project located within a mapped buffer for habitat for a state endangered, threatened, or special concern species?
3. Is the feature a mapped stream barrier?
4. Is the location identified as a large undeveloped habitat block connector?
5. Is the feature a mapped stream barrier?
6. What is the drainage area to (i.e. watershed size of) feature?
7. Is the feature located within an identified FEMA 100-year floodway?
8. Is the feature subject to sea level rise (SLR) and/or storm surge (SS)?
9. What percentage of the drainage area to the feature is impervious?
10. Is the road a sole access, hurricane evacuation route or emergency access for emergency response vehicles?
11. Is the project within an eligible historic district or is it an eligible property?
12. Is the project within an MS4 community or an urban impaired stream watershed?
<table>
<thead>
<tr>
<th>Type of Value</th>
<th>Question Number</th>
<th>Proxy Indicator</th>
<th>Proxy Description</th>
<th>Proxy Description Details</th>
<th>Data Source</th>
<th>Data Source Details</th>
<th>Key MaineDOT Staff</th>
<th>Narrative Scoring</th>
<th>Numeric Score</th>
<th>Proxy Risk Rating</th>
<th>Risk Rating by Value Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td></td>
<td>Is the drainage area part of a priority Atlantic salmon watershed?</td>
<td>The three Maine Atlantic salmon habitat recovery units (SHRU's) have been designated into “tiers” based on habitat value as determined by USFWS, NMFS, and Maine DMR. These designations relate to the Maine Atlantic salmon Programmatic Consultation requirements for design and construction.</td>
<td>budget, process, schedule</td>
<td>GIS layer</td>
<td>MEGIS ASHAB3</td>
<td>Ham</td>
<td>Tier 3/Not applicable</td>
<td>0</td>
<td>Tier 2</td>
<td>1</td>
</tr>
<tr>
<td>Q2</td>
<td></td>
<td>Is the project located within a mapped buffer for habitat for a state endangered, threatened, or special concern species?</td>
<td>Presence of the habitat and/or any buffers critical to a lifestage of species listed under Maine's Endangered Species Act identifies the potential need for pre-construction surveys, passage modifications, or post-construction monitoring that may need to be incorporated into project design.</td>
<td>budget, process, schedule</td>
<td>GIS layer</td>
<td>MEGIS</td>
<td>Boyden</td>
<td>No</td>
<td>0</td>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td>Q3</td>
<td></td>
<td>Is the feature a mapped stream barrier?</td>
<td>USFWS, in conjunction with other non-government organizations, developed a GIS-data layer showing those stream crossings that have the potential or have been observed to be barriers to aquatic species' movement up and downstream. Mapped barriers may be prioritized for replacement.</td>
<td>budget, process, schedule</td>
<td>Stream Viewer ENV GIS layer</td>
<td>ENV GIS layer</td>
<td>Ham</td>
<td>No</td>
<td>0</td>
<td>Potential or Yes</td>
<td>1</td>
</tr>
<tr>
<td>Q4</td>
<td></td>
<td>Is the location identified as a large undeveloped habitat block connector?</td>
<td>Presence of GIS-mapped large undeveloped blocks of potential habitat on either side of a road increases the likelihood that terrestrial species will cross roads that may otherwise serve as barriers to movement. Adjacent large habitat blocks may necessitate inclusion of wildlife crossing structures in any reconstruction.</td>
<td>process, schedule</td>
<td>GIS layer</td>
<td>turtles, EBKT, salamanders, moose/deer crash</td>
<td>Ham, Bostwick</td>
<td>No</td>
<td>0</td>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td>Q5</td>
<td></td>
<td>Is the existing structure greater than or equal to the calculated bankful width?</td>
<td>Maine's USFWS and USACE consider stream crossing structures with a span equal to or greater than 1.2 times the stream bankfull width (1.2 x bfw) to be fully accessible for all aquatic species. Any crossing less that 1.2 x bfw may need to be upsized or pay in lieu fee mitigation depending on its location.</td>
<td>budget, schedule</td>
<td>StreamStats with MATS [Span_With]</td>
<td>StreamStats with MATS [Span_With]</td>
<td>Hebson</td>
<td>≥1.2x calculated bankful width</td>
<td>0</td>
<td>1.0-1.2x calculated bankful width</td>
<td>1</td>
</tr>
</tbody>
</table>
ArcGIS Pro Model Builder
Integrity - Competence - Service
Opportunities….

- Visualize key environmental factors
- Use a data set that is refreshed every morning
- Bring data into any application
- Make NEPA decisions earlier
Challenges...

The data, in beta, is wrong.

Errors are inherent in everything…the process is not static.

Discomfort with decision-making by “mindless” technology…

Not a replacement for best professional judgment.

Setting priorities versus understanding risk.

Down the risk ‘rabbit hole’…enter others’ priorities!
“Transitional Infrastructure”

- Lifeplaces
- Regulatory feasibility
- Best engineering judgment
- Institutional risk tolerance
- Scientific community
Integrity - Competence - Service
Back to risk...

We need to worry about everything.

The size of the problem depends on the size of the lens.

Whether it’s tolerable depends on the view.

BCA is not the only ruler that is relevant.

We won’t know if we were right until we get there.