Low Regret = “Restoring the buffering capacity of natural infrastructure to address needs of communities and ecological systems” (EDF 2015)
Cardiff State Beach & HWY 101 - Suffering >0

- HWY 101 Closures from undermining and flooding
- Sea level rise would make things worse
- Limited habitat value
Cardiff Beach Grey Solutions (circa 1998)

Table 8-1 INITIAL COST ESTIMATE OF SHORE PROTECTION ALTERNATIVES

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Construction Total ($)</th>
<th>Total Cost per Linear Foot ($/ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stone Revetment</td>
<td>8,022,000</td>
<td>1,800</td>
</tr>
<tr>
<td>Reduced Stone Revetment with Splash Wall</td>
<td>7,717,000</td>
<td>1,700</td>
</tr>
<tr>
<td>Vertical Seawall</td>
<td>12,615,000</td>
<td>2,800</td>
</tr>
<tr>
<td>Block Retaining Wall</td>
<td>6,590,000</td>
<td>1,500</td>
</tr>
<tr>
<td>Steel Sheet Pile Wall</td>
<td>10,470,000</td>
<td>2,400</td>
</tr>
<tr>
<td>Concrete Sheet Pile Wall</td>
<td>10,749,000</td>
<td>2,400</td>
</tr>
<tr>
<td>Hybrid</td>
<td>8,663,000</td>
<td>1,900</td>
</tr>
</tbody>
</table>

(Source: M&N 1998)
Cardiff Beach Green/Grey Solution (constructed)

- $4M (construction with soft costs)
- **Multiple-benefits:**
  - Shoreline protection
  - Dune habitat
  - Coastal trail
  - Other roadway and access improvements

(Source: M&N 2015)
Natural Infrastructure Project Differences

- Limited Eng. Design Guidance
- Unique Partnerships (government, academia, non-profits)
- Monitoring to inform Adaptation
- Long-term Maintenance

(Source: Cal State Parks)
Tips for Project Implementation

- What vulnerabilities could be solved with a natural infrastructure approach?
- Can an existing project or program be modified to add natural infrastructure?

(Source: City of Imperial Beach 2015)