Presentation Outline

1. Introduction to Scottish Coast
   – Why is understanding coastal change important in Scotland?

2. What is the NCCA

3. Methods

4. Results and Outcomes

5. Conclusions
Scottish coastal assets

Population

• 20% of the Scottish population live within 1 km of the coast (1 million)

• ~12% of European coast (Pranzini and Williams 2013)

• Highly variable: resilience & assets
Paradox of Coastal Erosion in Scotland

• Many organisations have an obligation to incorporate coastal erosion within their statutory advice. Yet **there is no centralised national dataset on coastal erosion** – no single organisation has responsibility.

• Part of this is due to the devolved nature of erosion, where it is the responsibility of the landowner. **The LA normally intervenes when there is a flooding concern.** This means the LA may be aware of issues, but there is no national oversight.

• Any organisation will struggle to objectively appraise the risk coastal erosion poses to it’s own interests, let alone collaborate with others.
Current Data on Erosion

UK CCRA (2012) noted this as an evidence gap in Scotland:

‘Maps of past erosion, current state and future erosion conditions are required.’


• Angus and Fife both have an SMP
What’s coastal erosion got to do with flooding?

Sea levels are rising across Scotland and this is already leading to increased flood occurrences. e.g. Aberdeen, Millport and Stornoway. Ball T, Werrity A, Duck RW, Edwards A, Booth L & Black AR. (2008)

Coastal flood risk in Scotland is expected to grow most rapidly in the coming decades. Estimated increase in total properties at risk for a 10% AP flood:

<table>
<thead>
<tr>
<th>10% AP (10yr)</th>
<th>Fluvial</th>
<th>Coastal</th>
<th>Surface Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current estimates</td>
<td>15,420</td>
<td>4,121</td>
<td>9,672</td>
</tr>
<tr>
<td>2035 estimates</td>
<td>18,456</td>
<td>6,107</td>
<td>12,052</td>
</tr>
<tr>
<td>Increase</td>
<td>3,036</td>
<td>1,986</td>
<td>2,380</td>
</tr>
<tr>
<td>% increase</td>
<td>19.7%</td>
<td>48.2%</td>
<td>24.6%</td>
</tr>
</tbody>
</table>

And this **excludes** erosion exacerbated flooding. SG & JBA (2014)
National Coastal Change Assessment (NCCA)

A major policy-driven pan-government research project collating data and information on historic and future coastal change.

NCCA has/will:

• Undertake a quality assessment on existing data
• Establish the past changes along Scotland's coastline
• Extrapolate the historic change into the future
• Undertake an initial assessment of societies' interests within these areas (road, railways, houses etc.)
• Review national and regional coastal policies

Enable Strategic Planning
Who is involved?

50+ organisations are involved in the development of the project, and will also have access to the outputs.
Who is involved?

Aberdeen City Council
Aberdeenshire Council
Adaptation Scotland
Angus Council
Argyll and Bute Council
BGS
Clackmannanshire Council
Clyde Forum
CnES
CREW
Crown Estates
Dept of Envi, NI
Dumfries & Galloway Council
Dundee City Council
East Lothian Council
Edinburgh City Council
Falkirk Council
Fife Council
FCERM.net
Forth Estuary Forum
Glasgow City Council
Herriot Watt University
Highland Council
Historic Scotland
Inverclyde Council
Keep Scotland Beautiful
Marine Scotland
MoD
Moray Firth Partnership
Moray Council
N.Ayrshire Council
National Library of Scotland
Orkney Islands Council
Ordnance Survey
Perth and Kinross Council
RCAHMS
Renfrewshire Council
RSPB
S.Ayrshire Council
Scottish Borders Council
Scottish Coastal Forum
Scottish Government
SEPA
Scottish Golf Environment Group
Scottish Golf Union
Shetland Islands Council
SNH
Solway Firth Partnership
St Andrews University
Stirling Council
Transport Scotland
University of Glasgow
West Dunbartonshire Council
West Lothian Council

Funded by
Scotland’s centre of expertise for waters
NCCA Methods – Historic Change

• 1890s OS Second Edition Country Series Maps

• 1970s OS 1:10,000

• Current MHWS (derived from LiDAR/Aerial Photography)
MHWS Extraction
NCCA Methods – Historic Change

- 1890s OS Second Edition Country Series Maps
- 1970s OS 1:10,000
- Current MHWS (derived from LiDAR/Aerial Photography)
- Calculate the change rate between these lines (distance/time)
Use of OS MasterMap data

'current coastline'
National Mapping agency

2009 Aerial Imagery

Scot Gov Lidar (2011-12)

160m accretion
The NCCA has established...

- Scotland’s coastline is **21,234 km** long
- **4,434 km** is soft / erodible
- SG LiDAR covers **1,710 km** of MHWS & will be used to update MHWS
- This leaves **2,724 km** which was checked to ensure it’s accuracy
- Of this **2,297 km (84%)** was found to be representative
- **427 km (16%)** needed revision
- **120 km** updated using OS supplied DSMs
- **307 km** needs to be updated in the future

(all measured on OS MasterMap)
Fife – 1890s to 1970s
Fife – 1970s to Modern
### Fife Statistics

#### 1890s to 1970s

<table>
<thead>
<tr>
<th>Fife Character</th>
<th>Length (km)</th>
<th>Length (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard &amp; Mixed</td>
<td>74.1</td>
<td>33.9</td>
</tr>
<tr>
<td>Artificial</td>
<td>88.8</td>
<td>40.7</td>
</tr>
<tr>
<td>Soft</td>
<td>55.5</td>
<td>25.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>218.4</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

#### 1970s to 2010s

<table>
<thead>
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<th>Fife Character</th>
<th>Length (km)</th>
<th>Length (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard &amp; Mixed</td>
<td>77.2</td>
<td>34.1</td>
</tr>
<tr>
<td>Artificial</td>
<td>87.4</td>
<td>38.6</td>
</tr>
<tr>
<td>Soft</td>
<td>61.8</td>
<td>27.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>226.4</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

#### Max Soft Advance (m)
- 537 North Tentsmuir
- 386 North Tentsmuir

#### Average Soft Change (m)
- 25
- 21

#### Max Soft Retreat (m)
- 556 South Tentsmuir
- 196 North Tentsmuir
Improving the evidence base (Montrose)

NCCA overlaid with Angus SMP

- Supporting a policy led approach to coastal management (better than reactive approach) thus supporting the LA as Coastal Protection Authorities

- Also informing Scottish Planning Policy, Flood Risk Management Strategies, Local Development Plans, Climate Change Adaptation Programme, National & Regional Marine Plans etc
Interim results available online...

www.dynamiccoast.com
The future coast?

Future coast: 25 years (i.e. 25 x past rate)

Future coast will be amended by CESM.
Coastal Erosion Susceptibility Model (CESM)
Conclusions

• The NCCA is a pan-government project which has classified Scotland’s erodible coast for the first time. The project is due to finish in September 2016.

• It will inform statutory advice across Agencies and Local Authorities alike in support of their strategic planning individually, but also collaboratively, thereby supporting the SG Climate Change Adaptation Programme.

• It will inform areas where erosion may influence flood risk – currently not identified within flood mapping.
Conclusions

- It has led to the first **checking & update of MHWS since the 1970s**, and ensured that the OS can and will maintain this in the future. The NCCA has led to the OS considering revisions to their coastal mapping methods across the whole of the UK.