

# Using ArcGIS to increase productivity and accuracy in meeting oil spill planning and mitigation

exprodat

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# Summary

1	Introduction
2	The Environmental Process
3	GIS Application to DECC Legislation
4	Financial Responsibility Analysis
5	Conclusions



## Introduction

- Start of a GIS for Environment
- GIS is becoming an important tool
  - Viewing
  - Analysing
  - Integrating
  - Sharing



Image from: http://news.bbc.co.uk/1/hi/scotland/8486571.stm



# Objectives

- Identify areas for GIS in Environment
  - Deployment of GIS data
  - Workflows
- Improve workflow efficiency
  - Development of tools
  - Production of easily accessible GIS maps and data



#### **The Environmental Process**





# **Planning and Preparation:**

#### Environmental Impact Assessment

An assessment of the possible impacts that a proposed project may have on the environment.







Coull, K.A., Johnstone, R., and S.I. Rogers. 1998. Fisheries Sensitivity Maps in British Waters. Published and distributed by UKOOA Ltd. Ellis, J.R., Milligan, S.P., Readdy, L., Taylor, N. and Brown, M.J. 2012. Spawning and nursery grounds of selected fish species in UK waters. Sci. Ser. Tech. Rep., Cefas Lowestoft, 147: 56 pp.





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# **Planning and Preparation:**

Financial Responsibility Assessment

The assurance that operators and co-ventures have the financial resources to respond, control and compensate for any unintended and uncontrolled release of hydrocarbons from a well.





Process





Analysis Requirments and outputs...

Category	Assessment	High Score 3 Points	Medium Score 2 Points	Low Score 1 Points
Length of Coastline	Identify the length of coastline oiled in miles	Greater than 100 miles	Between 10 and 100 miles	10 miles or less
Fisheries	Identify the number of ICES squares transited	Greater than 5	Between 1 and 5	1 or less
Aquaculture	Identify number of Aquaculture sites on impacted coastline	Greater than 30	Between 5 and 30	5 or less
Shoreline Oil Volume	Identify the volume of oil to come ashore (m <sup>3</sup> )	Greater than 5000m <sup>3</sup>	Between 1000m <sup>3</sup> and 5000m <sup>3</sup>	Less than 1000m <sup>3</sup>



Requirements...

**Analysis Considerations** Length of Coastline, Number of ICES Rectangles, Aquaculture and Oil volume

**Data** Coastline polygon, ICES Rectangles, Trajectory polygon, Well Location, Oil Volume, Aquaculture Sites

**Analysis Applications** 4 key analyses, Accuracy and Precision



#### Analysis considerations...coordinate reference systems





#### Analysis considerations...coordinate reference systems





Analysis considerations...coordinate reference systems





Data consideration...trajectory accuracy





Analysis consideration...geometry and influence on analysis



exprod

Analysis consideration...coastline intersection



Analysis presentation...precision





Analysis presentation...precision





Analysis presentation...precision



exproda

#### Data considerations...aquaculture







#### Data considerations...aquaculture



expr



#### Analysis considerations...aquaculture



Data considerations...fisheries





#### Analysis considerations...fisheries



Analysis Requirments and outputs...

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Results from this analysis

Category	Assessment	High Score 3 Points	Medium Score 2 Points	Low Score 1 Points
Length of Coastline	Identify the length of coastline oiled in kilometres	304	-	-
Fisheries	Identify the number of ICES rectangles transited	7	-	-
Aquaculture	Identify number of Aquaculture sites on impacted coastline	-	26	-
Shoreline Oil Volume	Identify the volume of oil to come ashore (m <sup>3</sup> )	-	2,000m <sup>3</sup>	-



#### Resulting Score

Scores added together	Banding	FR Recommended (100% interest in well)
Exempt well category	None	Not considered necessary
5 or less	1	<b>US \$250m</b> – financial responsibility demonstrated by the operator to OPOL
6 or 7	2	<b>US \$375m</b> (US \$125m to address legal liability for pollution remediation and compensation in addition to financial responsibility demonstrated by the operator to OPOL)
8 or 9	3	<b>US \$500m</b> (US \$250m to address legal liability for pollution remediation and compensation in addition to financial responsibility demonstrated by the operator to OPOL)
10 - 12	4	<b>US \$750m</b> (recommendation to demonstrate US \$500m to address legal liability for pollution remediation and compensation in addition to financial responsibility demonstrated by the operator to OPOL)



## Financial Responsibility Assessment: GIS Process

	Geoprocessing	ф ×	Project
<ul> <li>Financial Responsibility Assessment</li> <li>Trajectory</li> <li>Oll Volume</li> <li>Output Geodatabase</li> <li>Output Folder</li> </ul>	Prinancial Responsionity Assessment Parameters Environments Trajectory Trajectory.Project     Oil Volume 2000 Output Geodatabase HSE FR Analysis.gdb Output Folder HSE FR Analysis		<text><text><text><text><text></text></text></text></text></text>
	Workflow can be found her	<u>e</u>	

- Work time reduced from 4 hours to < 5 minutes</li>
  - 98 % decrease in time spent on process

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Catagory_Assessment_Score						
	Score Parameter					
		3	Oil Volume			
		2	Length of Oiled Coast			
H		2	ICES Count			
		1	Aquaculture Count			
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# Other Areas of potential GIS use: Preparation and Planning





# **Questions & Answers**







**GIS Consulting** 

**GIS Software** 

**GIS Training** 



Simon Kettle – <u>skettle@exprodat.com</u>

