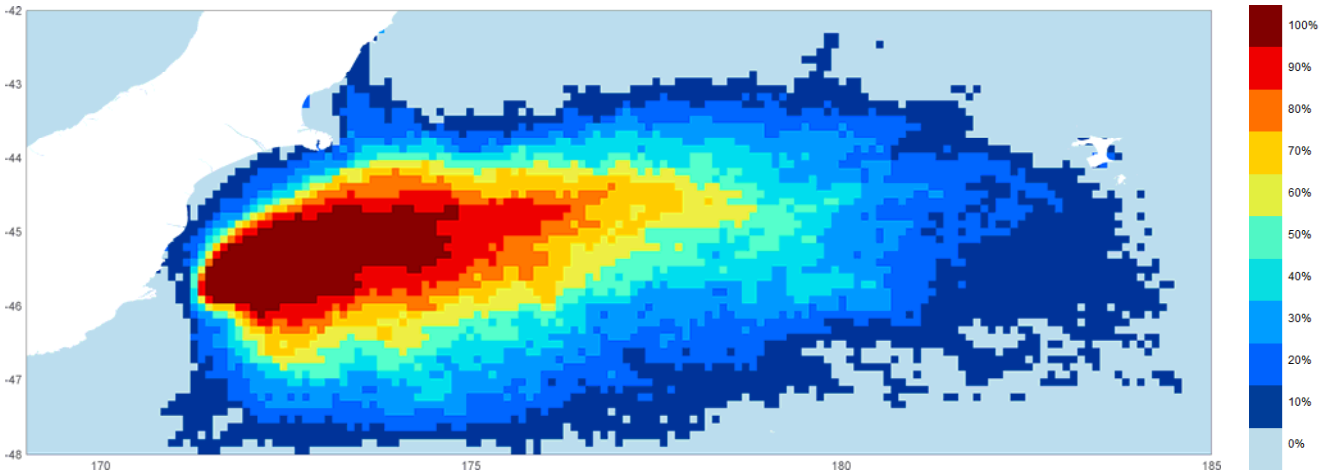
TRAJECTORY ANALYSIS OF DEEP SEA OIL SPILL SCENARIOS IN NEW ZEALAND WATERS

CANTERBURY BASIN: CARAVEL PROSPECT

Prepared for Greenpeace New Zealand



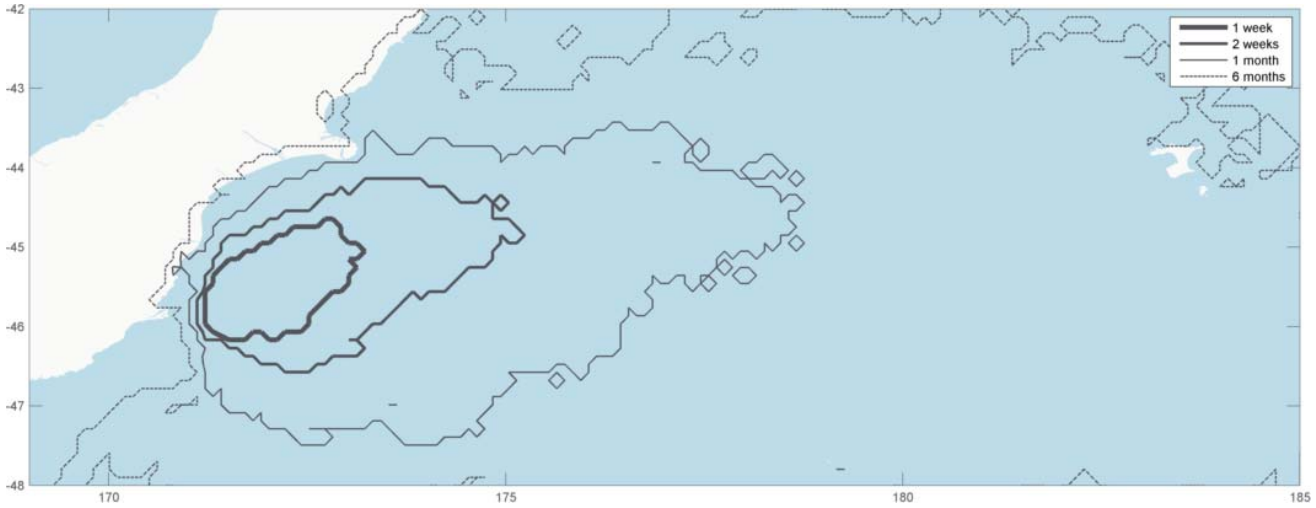
Percentage of medium crude spills that reached the level of concern of 1 g/m^2 (socio-economic threshold). The numerical model simulates a continuous spill of 10,000 bbl/day for 76 days during the summer season.

Greenpeace New Zealand has raised concerns about exploratory drilling operations for deep sea oil that are planned for the summer of 2013/2014 offshore off the east coast of the South Island in the Canterbury Basin. In April 2010, the Deepwater Horizon disaster in the Gulf of Mexico highlighted the wide-scale devastation that can be caused by a catastrophic deep sea well failure. We provide an evaluation of the likely dispersal trajectory of a deep water oil spill at the proposed exploration site. Our analysis uses industry standard numerical modelling techniques to conduct an oil-spill trajectory analysis and determine the extent of oil propagation, dispersion and beaching in the event of a deep water blowout. The numerical models are driven by a global database of meteorological and oceanographic conditions (waves, winds and tide) to reproduce the dispersion of thousands of oil spills under a variety of environmental conditions. We aim to describe a realistic deep sea blowout scenario based on past events and the best information available to us regarding the targeted prospects. We describe the impact analysis for Canterbury after 76 days of continuous oil input at a flow rate of 10,000 bbl/day during the summer season.

We considered several levels of concern by defining socio-economic and ecological thresholds for both land and sea. The socio-economic threshold relates to closure of fisheries at sea (> 0.01 g/m^2) or shoreline clean ups on amenity beaches (>1 g/m^2) whereas ecological threshold integrates degrees of oiling known to mortally impact sea birds and other wildlife (>10 g/m^2). In Canterbury, the extent of the probabilistic spread is much larger than for Taranaki as most spills drift freely across the ocean surface for months without encountering land. The model shows a wide impact plume that extends eastwards as far as the Chatham Islands. The socio-economic threat zone, where fisheries could potentially be closed due to visible oil on the sea surface, grows from an area of 14,300 km^2 after one week, to 162,100 km^2 after a month and 532,400 km^2 after 76 days. The socio-economic impact threshold at sea was reached during the simulation period at 91% of trajectories for the coastal waters of Kaikoura and between 21 and 44% for Oamaru, the Banks peninsula and Taiaroa Head.

Sites	Presence of oil		Socio-economic threshold at sea (0.01 g/m^2)		Socio-economic threshold on land (1 g/m^2)	
	summer	winter	summer	winter	summer	winter
Kaikoura	96 %	87 %	91 %	79 %	4 %	2 %
Banks Peninsula	52 %	49 %	44 %	43 %	4 %	6 %
Oamaru	31 %	23 %	30 %	20 %	5 %	3 %
Taiaroa Head	27 %	27 %	21 %	25 %	0 %	4 %
Chatham Islands	97 %	90 %	95 %	84 %	30 %	31 %
Bounty Islands	92 %	81 %	84 %	73 %	0 %	0 %

Oiling probability analysis: percentage of spills reaching individual sites and raising the oil thickness above the two socio-economical thresholds for the whole simulation (180 days)



Travel time (1 week, 2 weeks, 1 month, 6 months) of the 1 g/m^2 contour (visible oil sheen, socio-economic threshold at sea, potential closure of fisheries) for a combined 95 % of trajectories during the summer season.