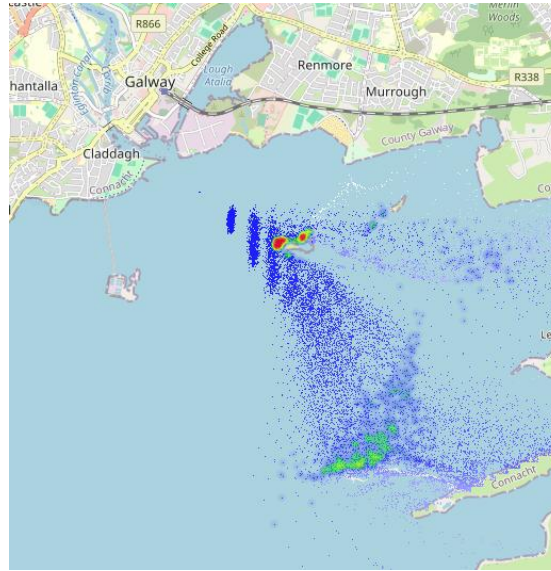


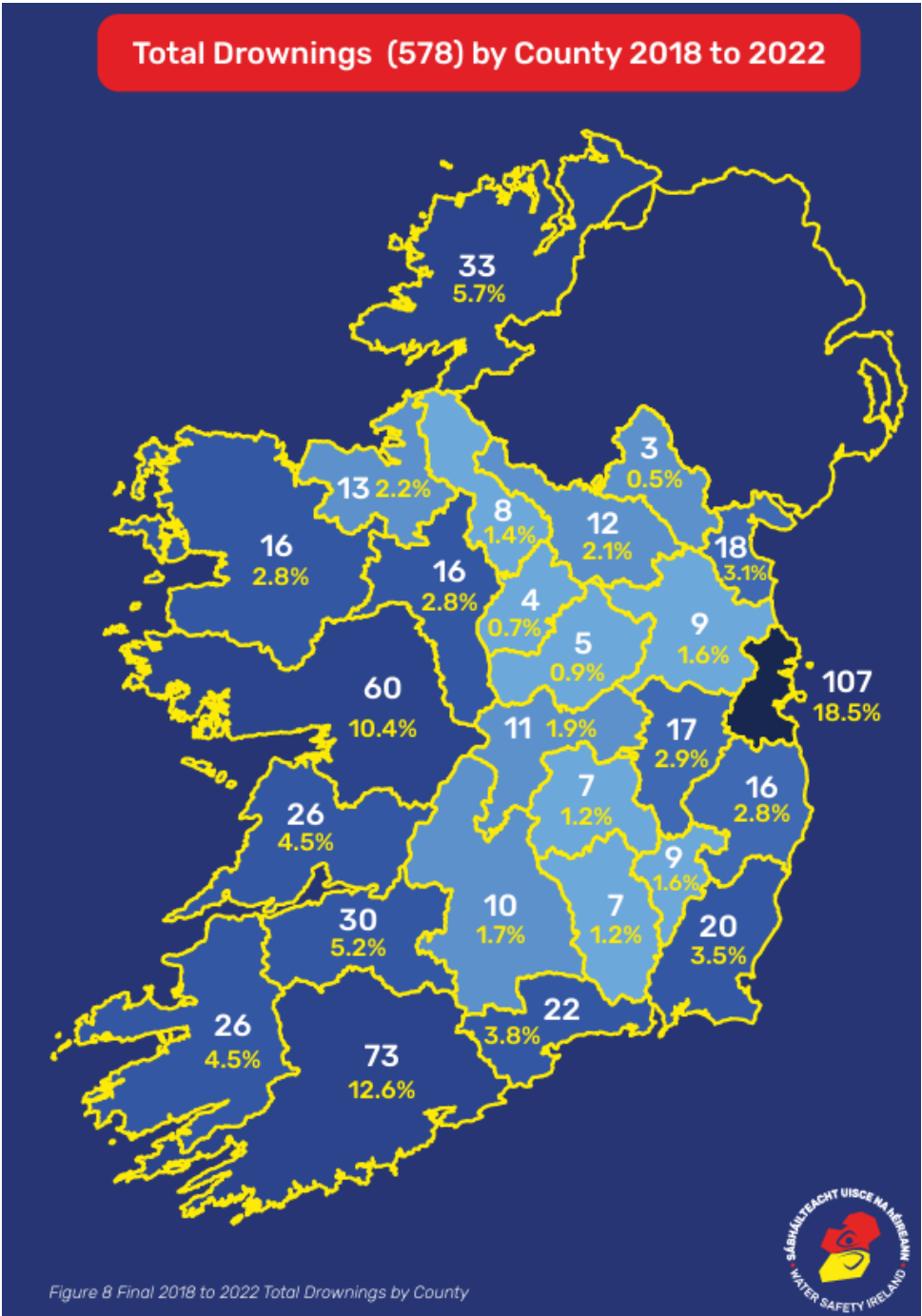
ADRIFT: A Lagrangian
Particle-Tracking
Modelling Framework in
Support of Search and
Rescue Operations at Sea



Models for Ocean Transport Workshop

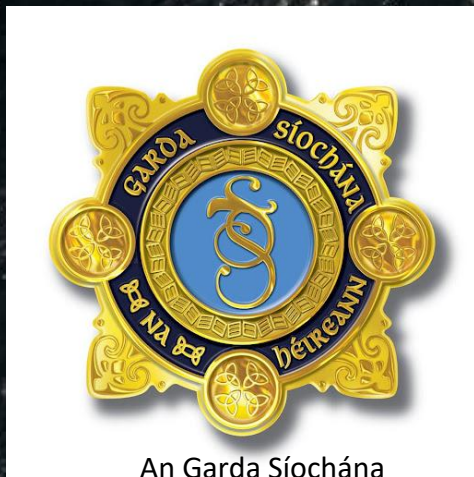
June 15–17, 2026

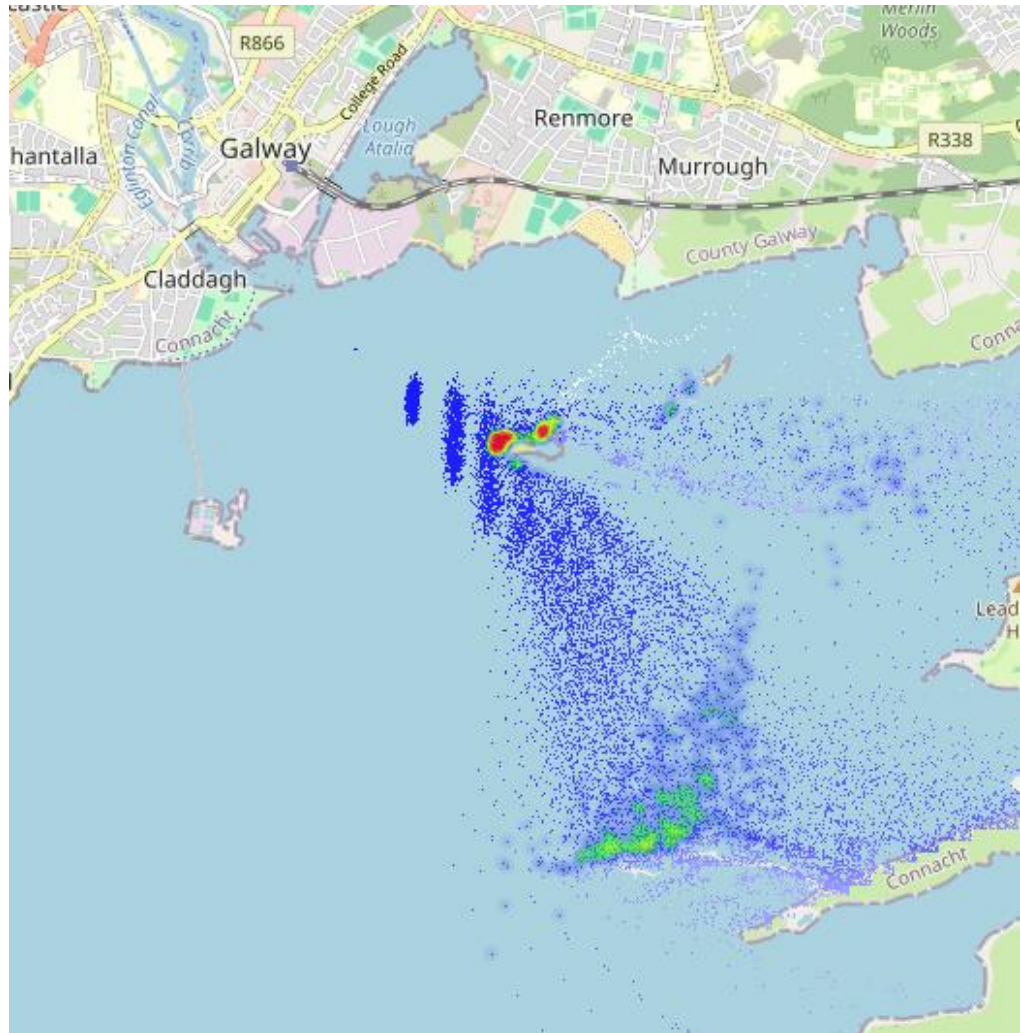
Santiago de Compostela



WATER SAFETY IRELAND
NATIONAL DROWNING
REPORT 2023/2024

Search & Rescue Organizations in Ireland





ADRIFT: User-friendly interface to run particle-tracking simulations with a focus on Search & Rescue at the sea

<https://adrift-kayak.marine.ie/>

u: paddler

p: f0ldEdL!On_s



Lagrangian Particle-Tracking Model

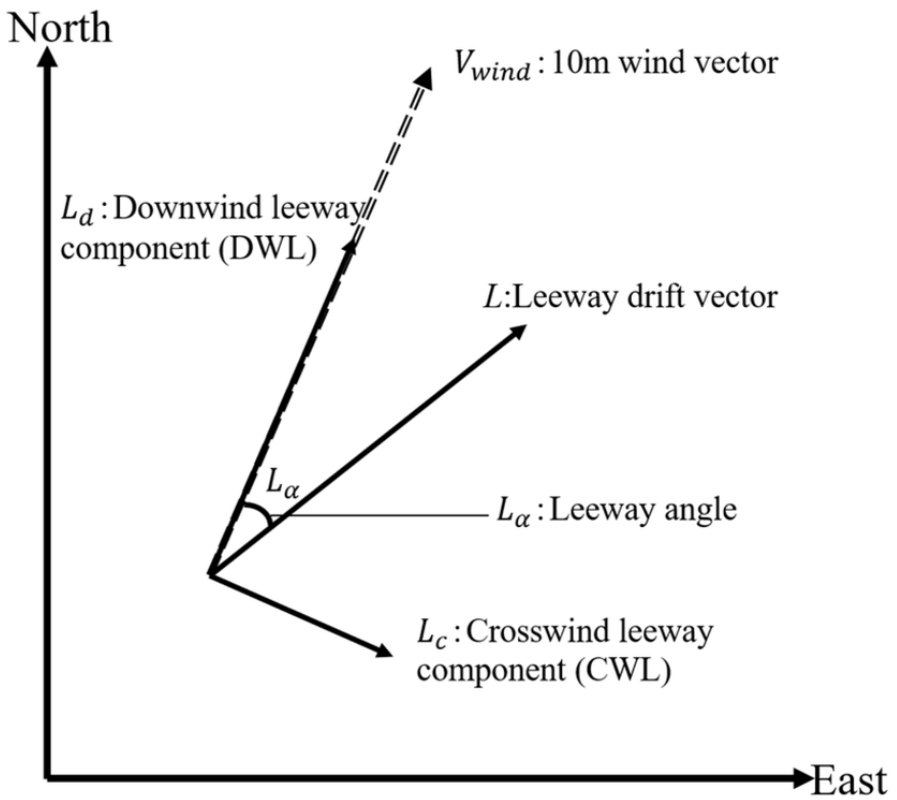


- OpenDrift (Dagestad *et al.*, 2014), an open-source Python-based framework for Lagrangian particle modelling developed at the Norwegian Meteorological Institute.
- Provides different sub-modules for different types of Lagrangian Particle-Tracking problems: e.g., **OceanDrift** –passive tracers moving with the oceanic currents–, **OpenOil** –oil spills–, **Leeway** –Search & Rescue model developed by the US Coast Guard (Allen, A.A, 2005: Leeway Divergence, USCG R&D Center Technical Report CG-D-05-05)–, etc.
- The **Leeway** module is used, which provides empirical coefficients to parameterize the direct effect of wind (windage) on the advection of different types of floating bodies.

Leeway Model



Leeway is the motion of the object induced by wind (10 m reference height) and waves relative to the ambient current (between 0.3 and 1.0 m depth). –Allan and Plourde (1999)



$$L_d = a_d W_{10} + b_d + \epsilon_d,$$

$$L_{c+} = a_{c+} W_{10} + b_{c+} + \epsilon_{c+}, \quad \text{Breivik, \varnothing et al. (2011)}$$

$$L_{c-} = a_{c-} W_{10} + b_{c-} + \epsilon_{c-}.$$

Empirically determined coefficients

PIW-6	6								
>PIW, deceased (face down)									
1.117	10.2	3.04	0.04	3.90	4.05	-0.04	-3.90	4.05	

PERSON-POWERED-VESSEL-1	41								
Sea Kayak with person on aft deck									
	1.16	11.12	4.12	0.41	0.00	4.39	-0.41	0.00	4.39

OIL-DRUM			72						
55-gallon (220 l) Oil Drum									
0.75	2.66	2.83	0.48	2.88	3.92	-0.45	-1.46	4.59	

Leeway Model

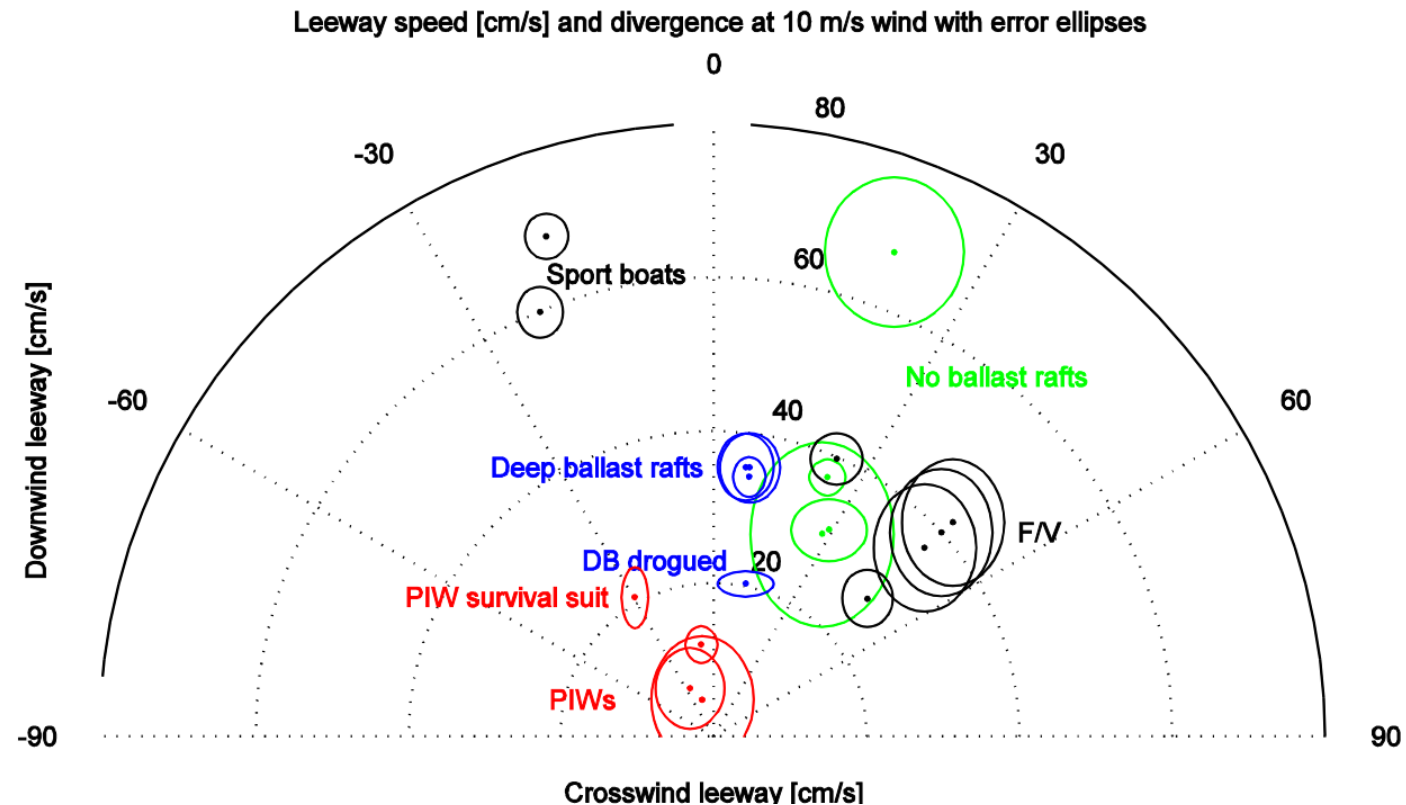
Leeway is the motion of the object induced by wind (10 m reference height) and waves relative to the ambient current (between 0.3 and 1.0 m depth). –Allan and Plourde (1999)

Breivik, Ø et al. (2011)

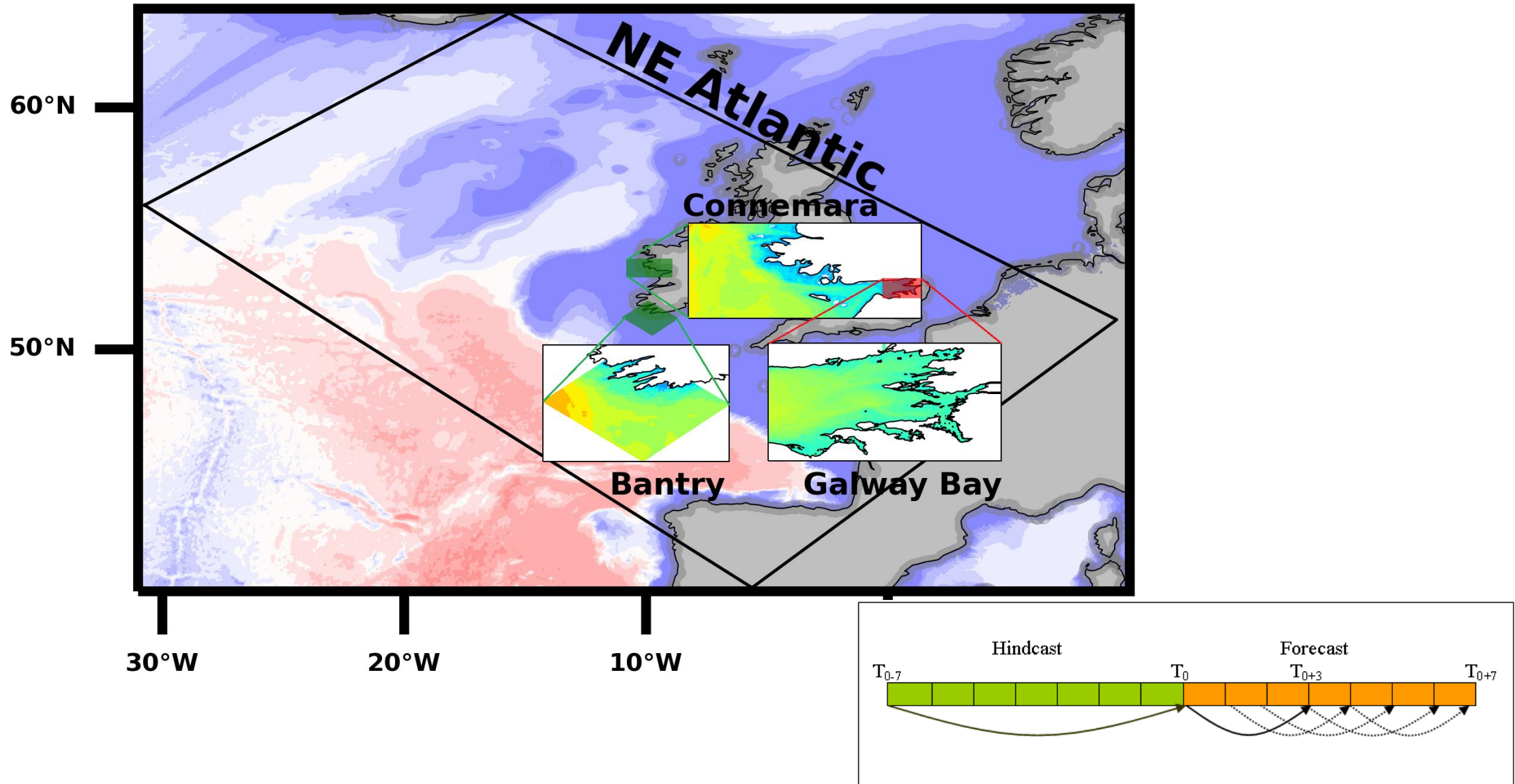
$$L_d = a_d W_{10} + b_d + \epsilon_d,$$

$$L_{c+} = a_{c+} W_{10} + b_{c+} + \epsilon_{c+},$$

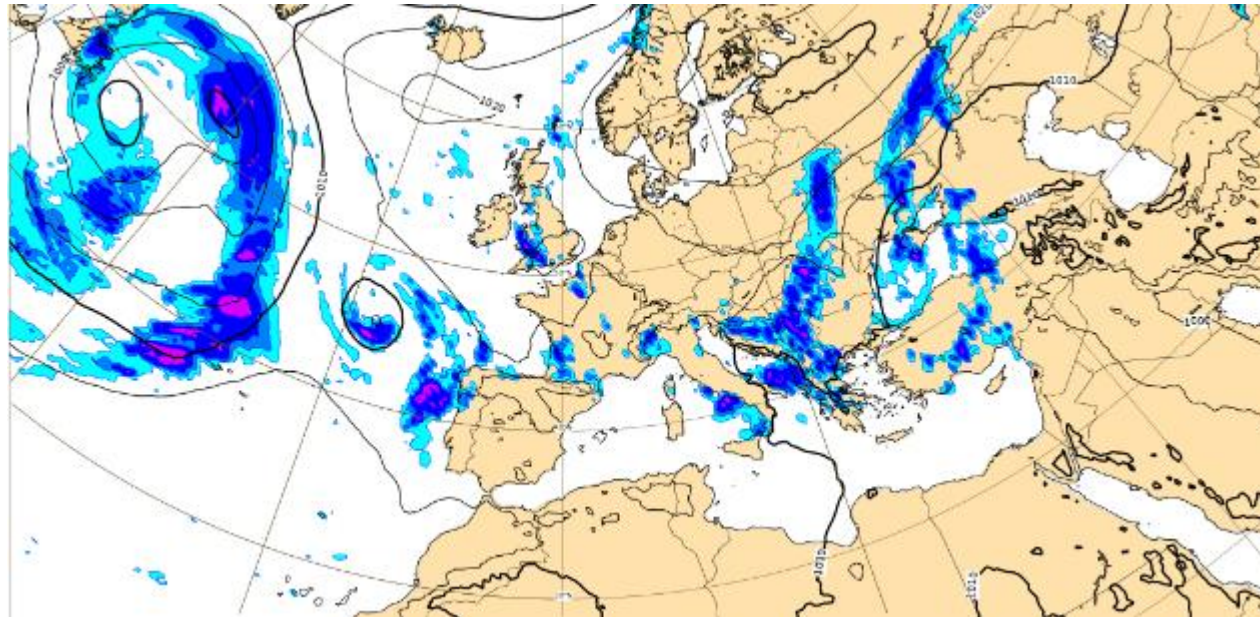
$$L_{c-} = a_{c-} W_{10} + b_{c-} + \epsilon_{c-}.$$



Oceanic model



Atmospheric model



ECMWF (European Centre for Medium-Range Weather Forecasts)

Marine Institute predicted sea surface tracking.

LATITUDE. Please, enter the approximate latitude where the object entered the water. Alternatively, drag the marker on the map on the right.

53.370630256701254

LONGITUDE. Please, enter the approximate longitude where the object entered the water. Alternatively, drag the marker on the map on the right.

-6.0468063270673165

RADIUS. Use the slider below to select a radius of dispersion around the centre. This is used to account for uncertainties on the location where the object entered the water.

250 metres

ENTRY TIME. Please, enter the time when the object entered the water. If the entry time is known with high accuracy, select the "Exact time" option. Otherwise, select the "Time interval" option. Notice that all the times to be selected in the calendar forms below are in Dublin time. Mind the offset with your local time, if any.

☒ Time interval ☐ Exact time

START. Please, enter the earliest time when the object may have entered the water.
Available: from 2026-05-20T23:00:00Z to 2026-06-10T23:00:00Z (UTC)

2026 Jun 08 12:00 AM

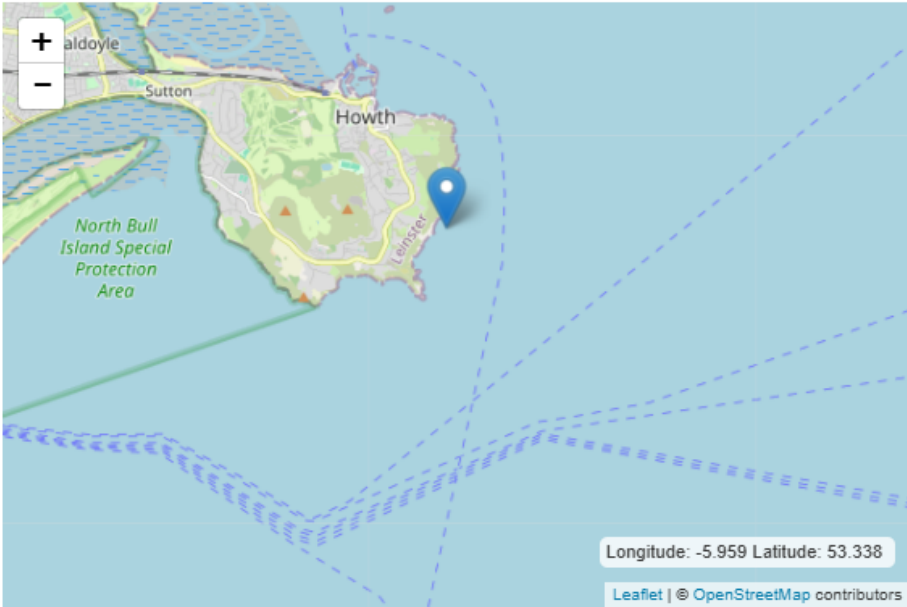
END. Please, enter the latest time when the object may have entered the water.
Available: from 2026-05-20T23:00:00Z to 2026-06-10T23:00:00Z (UTC)

2026 Jun 08 12:00 AM

END OF SIMULATION. Please, enter the end time of the simulation.
Available: from 2026-05-20T23:00:00Z to 2026-06-10T23:00:00Z (UTC)

2026 Jun 11 12:00 AM

OBJECT TYPE. Select the object type from the drop-down list below.
PIW-6 PIW, deceased (face down)



User input

<https://adrift-kayak.marine.ie/>

u: paddler
p: f0ldEdL!0n_s



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Object list

PIW-1 Person-in-water (PIW), unknown state (mean values)

PIW-6 PIW, deceased (face down)

LIFE-RAFT-DB-10 Life raft, deep ballast (DB) system, general, unknown capacity and loading (mean values)

PERSON-POWERED-VESSEL-1 Sea Kayak with person on aft deck

PERSON-POWERED-VESSEL-2 Surf board with person

PERSON-POWERED-VESSEL-3 Windsurfer with mast and sail in water

FISHING-VESSEL-1 Fishing vessel, general (mean values)

SAILBOAT-1 Sailboat Mono-hull (Average)

SAILBOAT-2 Sailboat Mono-hull (Dismasted, Average)

SLDMB Self-locating datum marker buoy - no windage

OIL-DRUM 55-gallon (220 l) Oil Drum

CONTAINER-1 Scaled down (1:3) 40-ft Container (70% submerged)

SEABED: Seabed Transport (no wind)

more options...

PIW-1 Person-in-water (PIW), unknown state (mean values)



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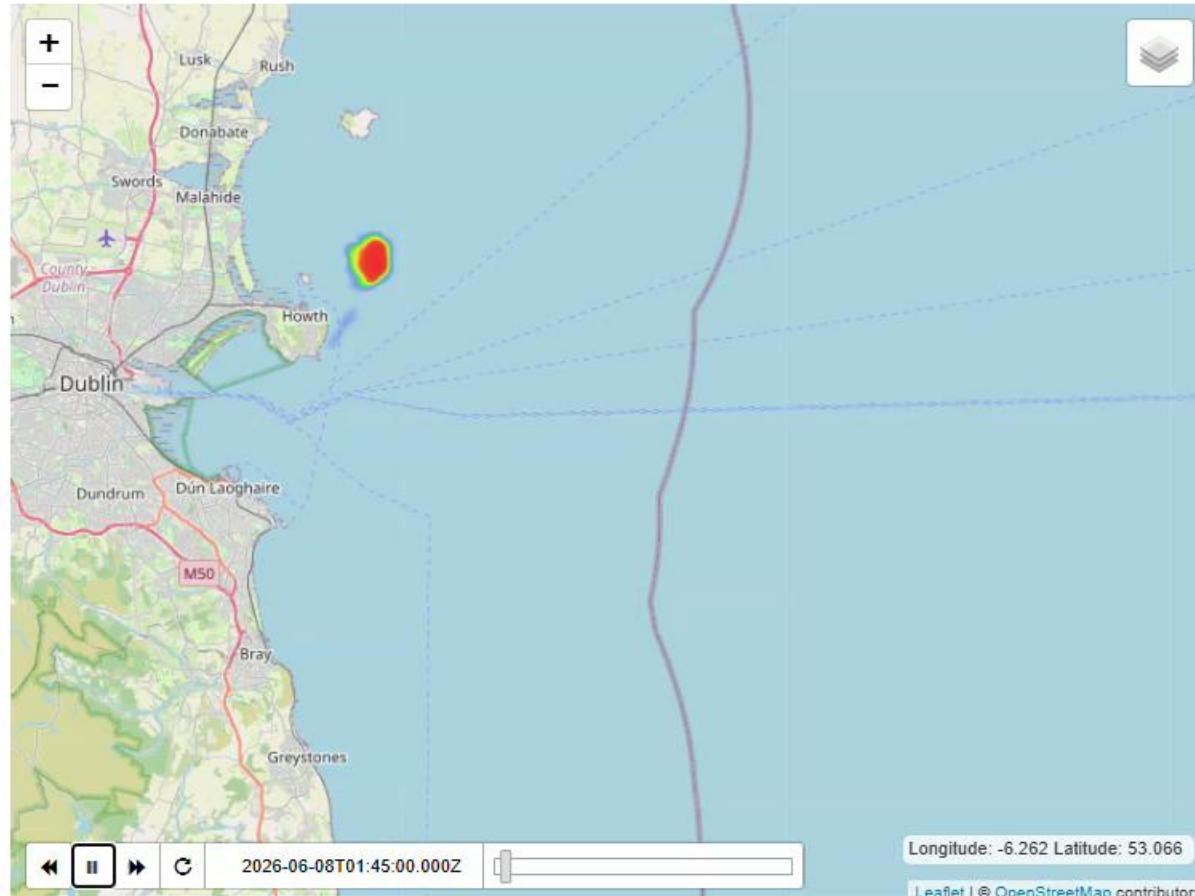
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u: paddler

p: f0ldEdL!0n_s



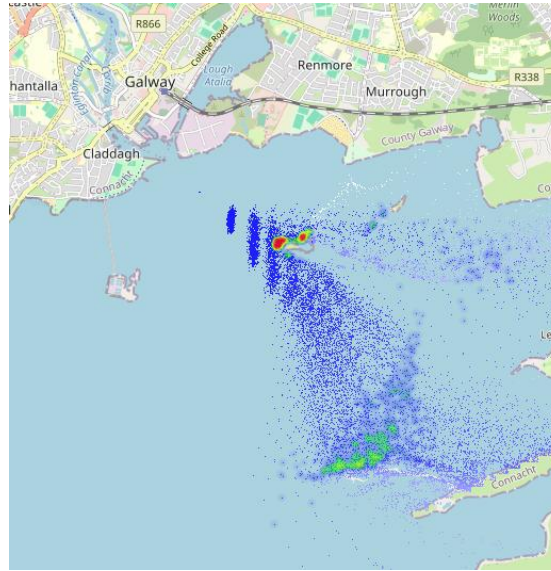
Output

Option to download a NetCDF with trajectories

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Thank you for your attention