

Skates & Ray

NWWAC/NSAC workshop on skates & rays management

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Rialtas na hÉireann
Government of Ireland



Có-mhainithe ag an
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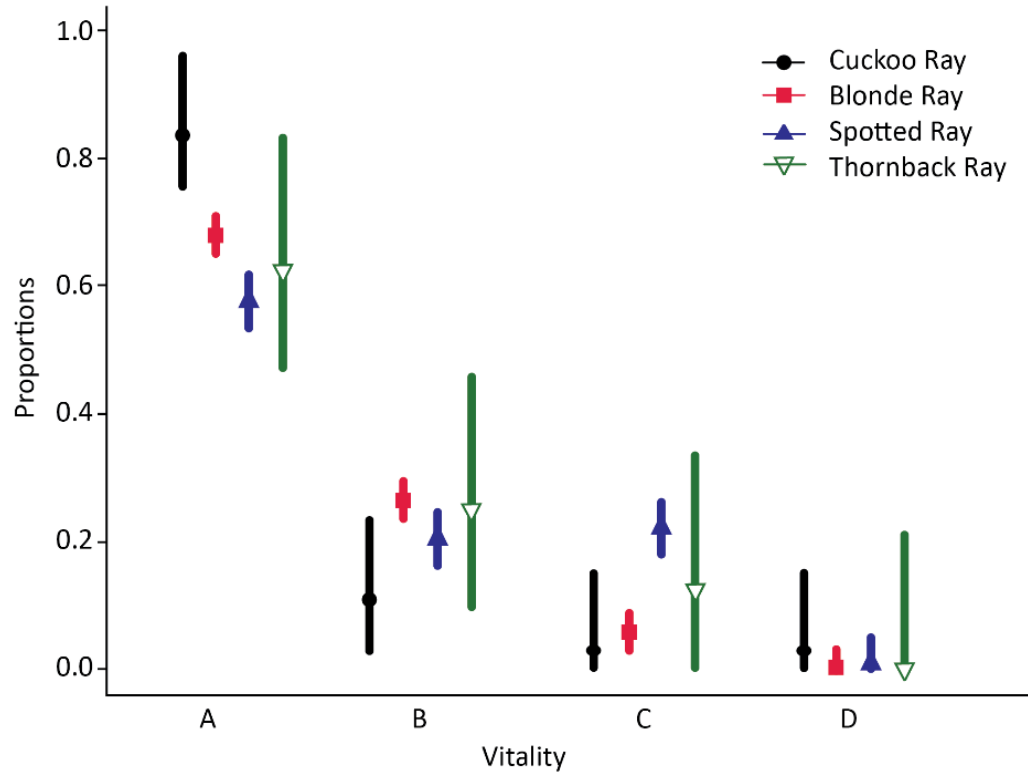
Cuckoo Ray survival

- **Background**
 - Landing obligation
 - Survival exemptions
- **The trial**
 - Methods and Results
- **Discussion**
- **Summary of French trial**

Cuckoo ray survival

- **Landing obligation**
 - Requirement to land all species subject to TAC
- **Survival exemptions**
 - *Nephrops*, Flatfish and skates and rays
 - Cuckoo ray given exemption to facilitate further research
 - Previous vitality assessments

Species	Vitality Category	Observed (N)	Raised (N)	Total vitality (%)
Cuckoo ray	A	31	31	84.0
	B	4	4	10.8
	C	1	1	2.7
	D	1	1	2.7
	Total	37	37	100.0
Blonde ray	A	144	628	67.9
	B	56	244	26.4
	C	12	52	5.6
	D	0	0	
	Total	212	924	100.0
Spotted ray	A	89	323	56.3
	B	31	112	20.5
	C	34	123	22.5
	D	1	4	0.5
	Total	155	562	100.0
Thornback ray	A	10	16	62.5
	B	4	7	25.0
	C	2	3	12.5
	D	0	0	
	Total	16	26	100.0



Captive monitoring study

- **Location**
 - Fishing
 - Holding facility
- **Assessments**
- **Analysis**

Trial location





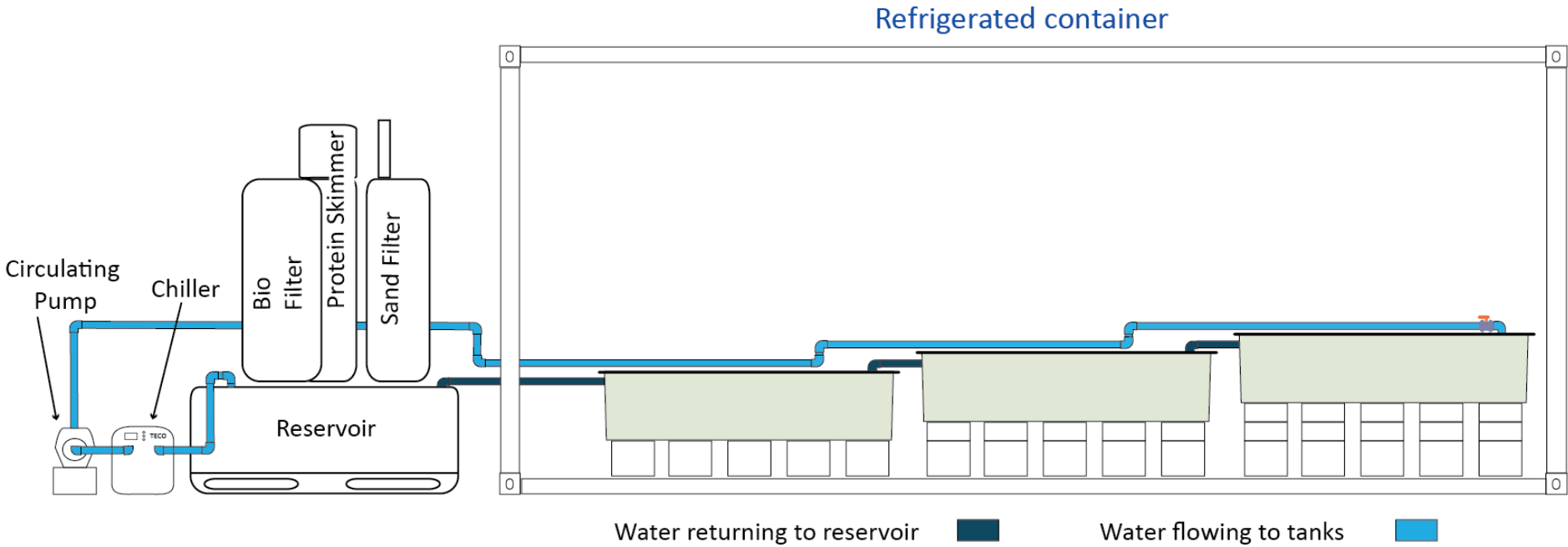
Methods

- **Condition assessments**

- Vitality —A (excellent), B (good), C (poor), D (moribund/dead)
- Reflex (RAMP)—movement and flex
- Injury —bleeding and bruising

- **Ongoing assessments**

- Maintained in closed recirculating system
- Observations up to 23 days





Analysis

- **Survival**

- Kaplan-Meier survival plots for test and control ray for 15 days observation
- Modelled to 25 days

- **Reflex and injury assessments**

- Summed and total standardised between 0 and 1
- Four reflexes each given score of 0.25 (to give max of 1)
- Injuries given weighting of 0.33, 0.66, & 1 depending on severity

Results

- **Catches**

- 12 test and two control hauls—224 and 55 min mean duration
- Bulk catch means of 293kg
- 61 (46 F & 15 M) test and 12 control cuckoo ray

- **Observations**

- 39 test cuckoo ray retained (22 morts at sea)
- 9 control cuckoo ray retained (3 morts at sea)

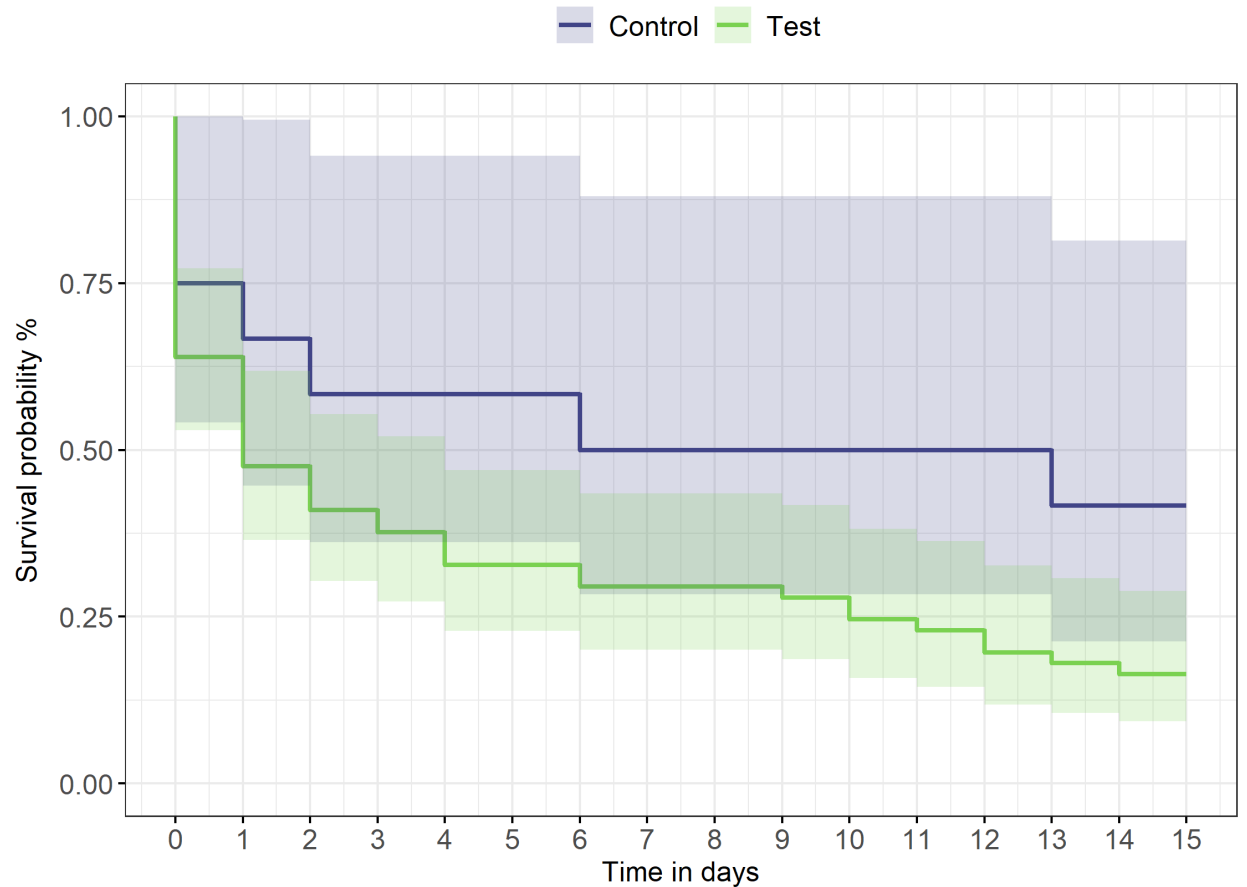
Results

▶ Test Ray mortality

- ▶ 36% on vessel
- ▶ 48% in holding system

▶ Control Ray mortality

- ▶ 25% on vessel
- ▶ 33% in holding system

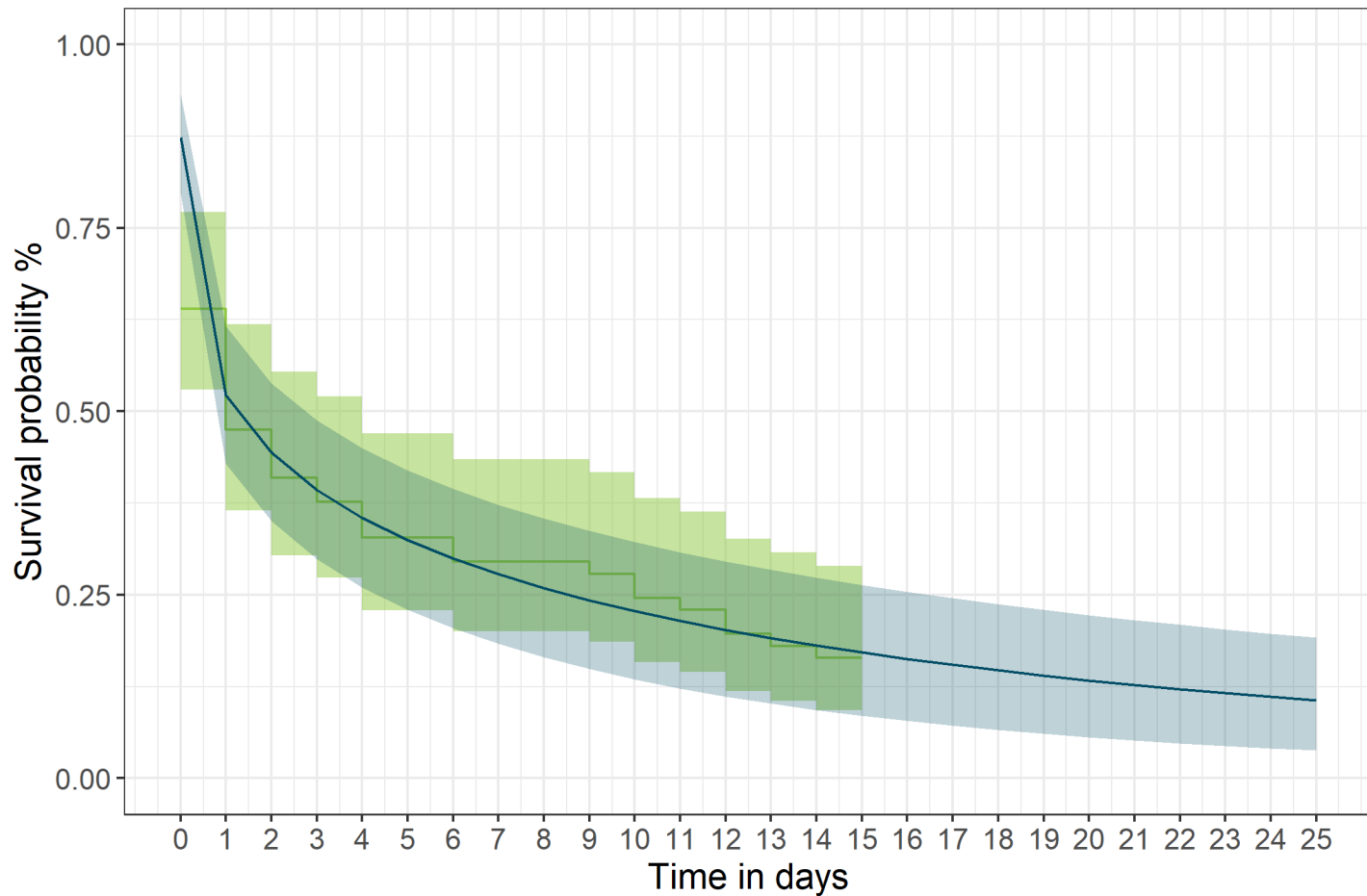


Number at risk: n (%)

Control	12 (100)	9 (75)	8 (67)	7 (58)	7 (58)	7 (58)	7 (58)	6 (50)	6 (50)	6 (50)	6 (50)	6 (50)	6 (50)	5 (42)	5 (42)	
Test	61 (100)	39 (64)	29 (48)	25 (41)	23 (38)	20 (33)	20 (33)	18 (30)	18 (30)	18 (30)	17 (28)	15 (25)	14 (23)	12 (20)	11 (18)	10 (16)

Results

Gamma fit and predicted survivability Observed



- ▶ Predictive model
 - ▶ 11% survival @ 25 days

Reflex impairment

Tail grab (%)	Spiracles (%)	Startle touch (%)	Body flex (%)	Mean ramp score
18.87	11.32	16.98	16.98	0.16

Injury

Bleeding head (%)	Bleeding body (%)	Bleeding tail (%)	Open wounds (%)	Fin damage (%)	Mean injury score
35.22	29.56	26.42	1.26	35.22	0.26

Vitality	Reflex	Injury	Reflex & Injury
A	0.00±(0.00)	0.21±(0.10)	0.12±(0.06)
B	0.03±(0.08)	0.30±(0.09)	0.18±(0.06)
C	0.14±(0.20)	0.32±(0.12)	0.24±(0.07)
D	0.81±(0.24)	0.30±(0.09)	0.53±(0.08)

Discussion

- **Survival**

- 11–16% for test
- 42% (15 days) for control
- Unlikely that holding system was at fault
- Similar results with French otter trawl study at 4 – 26%

Discard survival of *Leucoraja naevus* in a French fleet



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SURF (SURvie Raie Fleurie) 2020-2021

Fleet: French otter bottom trawlers targeting demersal fish (mainly anglerfish) in the Celtic Sea and northern Bay of Biscay. No selective device other than mandatory minimal mesh size.

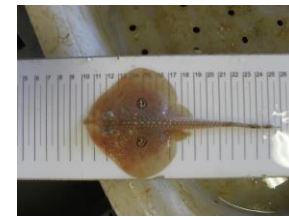
Method: Captivity combined with vitality sampling

- Monitoring in captivity of cuckoo rays sampled by vitality score + distribution of vitality on larger samples of fish
- Experimentation in winter and summer (+spring for vitality)
- Discard survival = Immediate survival x Asymptotic survival from cure-rate models x vitality

→ 143 fish held in captivity + 1720 observed for vitality

→ Final survival per trip estimated between 4% and 26%, high between-vessel variability

→ Survival of control < 100% (winter: 35%, summer: 80%)



SURF (SURvie Raie Fleurie) 2020-2021



Discussion

- Relatively low survival rates compared to other skates
 - Results apply to vessels using only minimal reglementary selective devices (minimal mesh size)
 - As survival rates vary between vessels, there appears to be a mitigation potential based on fishing practices (e.g., depth, fishing duration, selectivity device)
 - Results indicate that mortality of controls is partly linked to non optimal holding conditions
- ⇒ a correction may be applied based on observed survival rates of controls

Thank you for listening

Questions?

<https://bim.ie/publications/fisheries/>

