Akvaplan niva
eLice
Real time detection of free-swimming sea lice
"e-Lice"
2023-2024
Real time detection of free-swimming sea lice
Lionel.camus@akvaplan.niva.no
FHF

Akvaplan niva

VESO AQUA

KONGSBERG

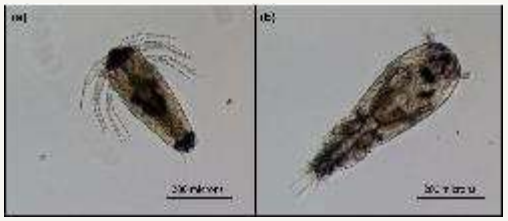
MP Consulting

HYDROPTIC

NIVA

NOVA SEA

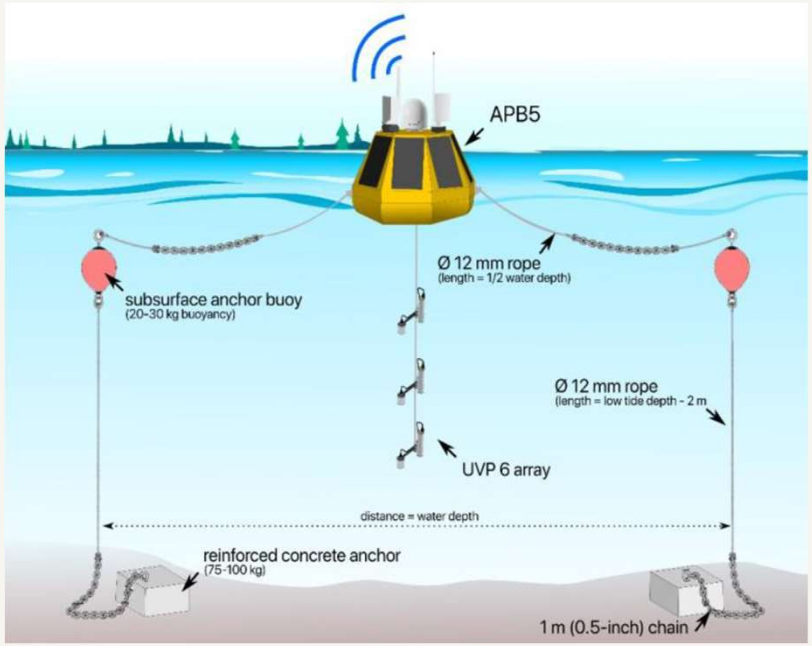
approach



Detection → identification → reporting

- Detection → High resolution camera
- identification → Artificial intelligence
- reporting → Dashboard → Decision making

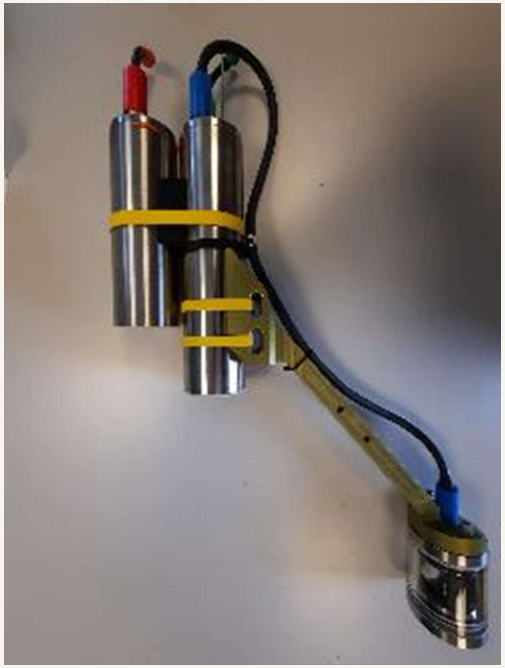
Final product



eLice
Real time detection of free-swimming sea lice

Detecting copepodite with UVP6 sensor

The sensor: a plankton camera – UVP6 -



40cm

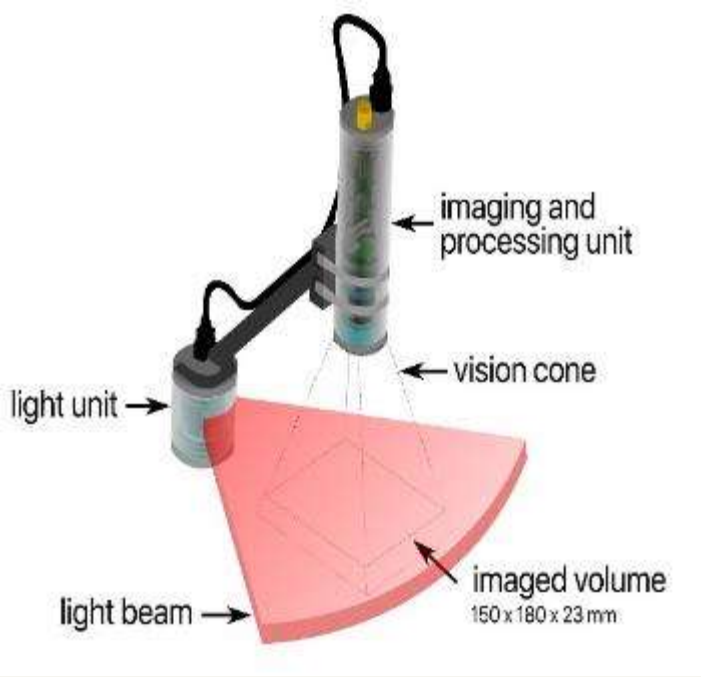


Fig. 2 The Underwater Vision Profiler version 6 (UVP 6). Drawing based on Picheral et al. (2021)

Akvaplan niva

Lab tests at VESO Aqualab

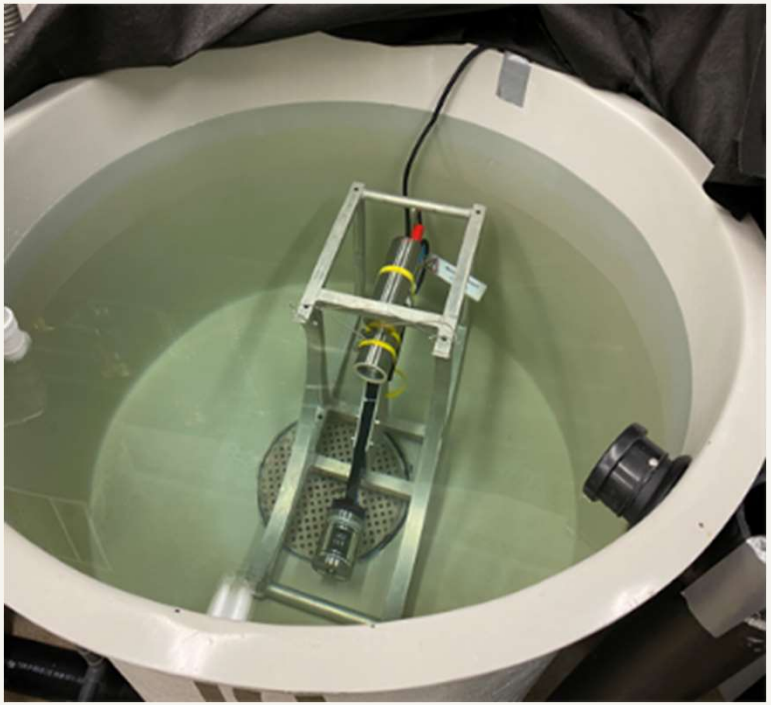
- Hatching system

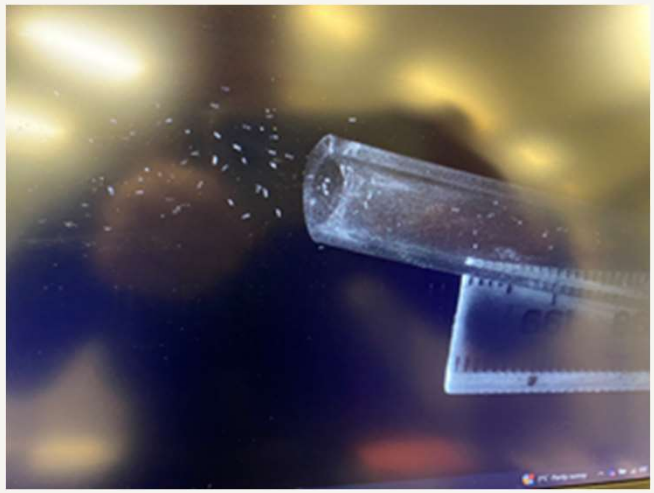
Photo: Sigmund Sevatdal

- Harvesting nauplii I and II + copepodids

Photo: Ragnhild Pettersen

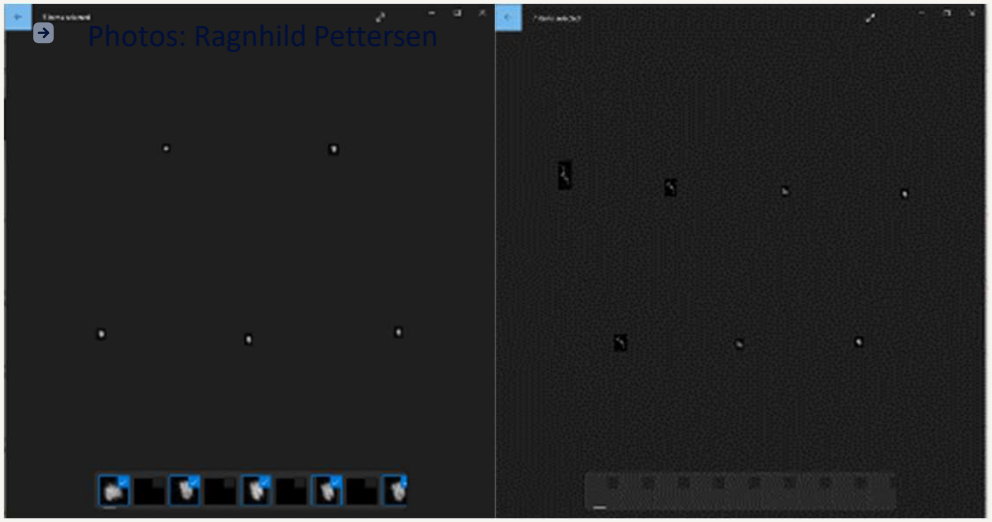
Lab tests at VESO Aqualab





- Photos: Ragnhild Pettersen

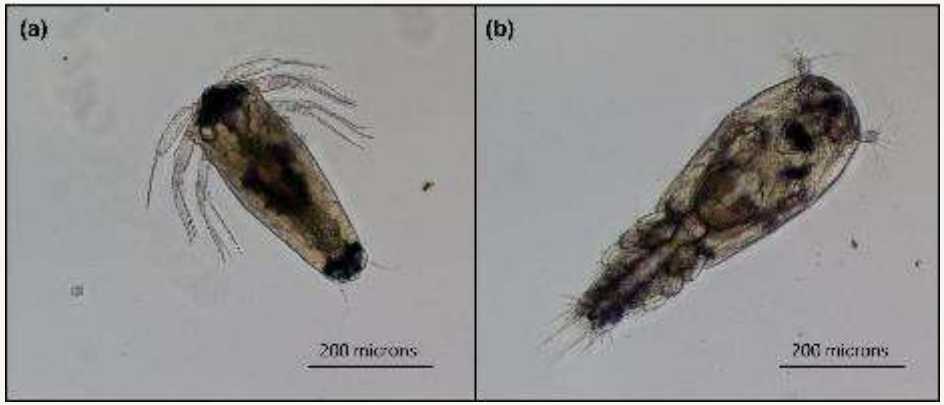
Imaging of sea lice

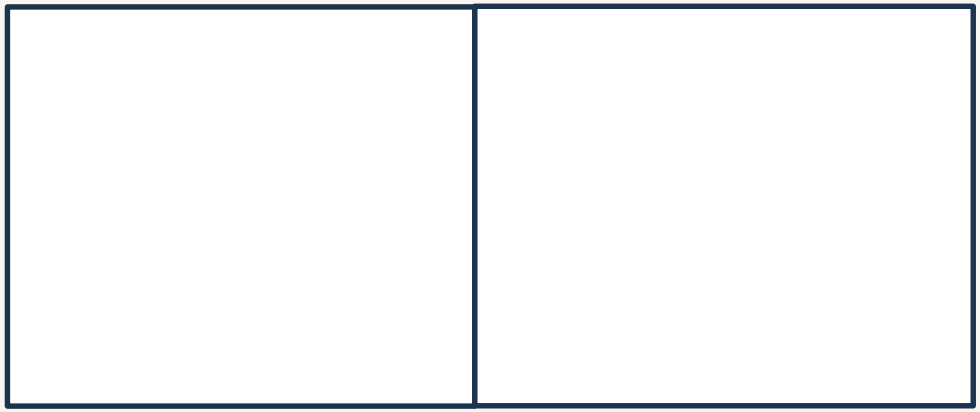


Photos: Ragnhild Pettersen

- > 5000 images

Identification: Algorithm Development



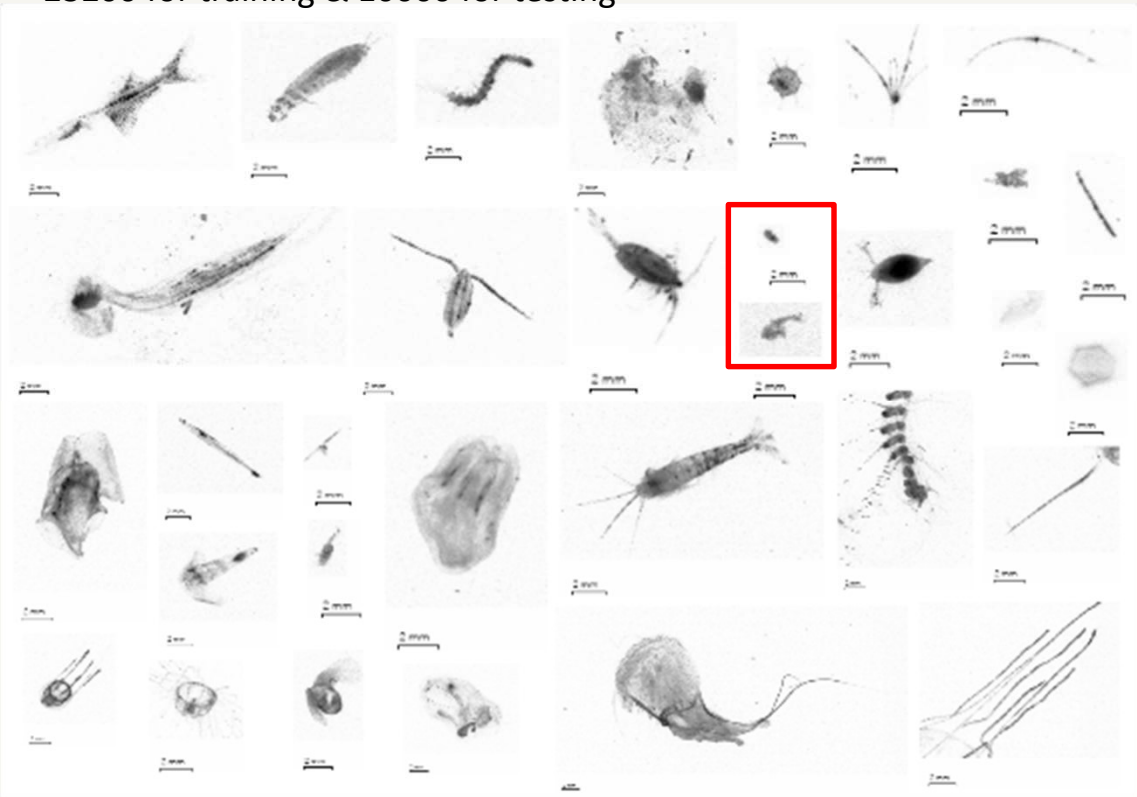


Akvaplan niva

Dataset for algorithm training and testing: 33124 images!

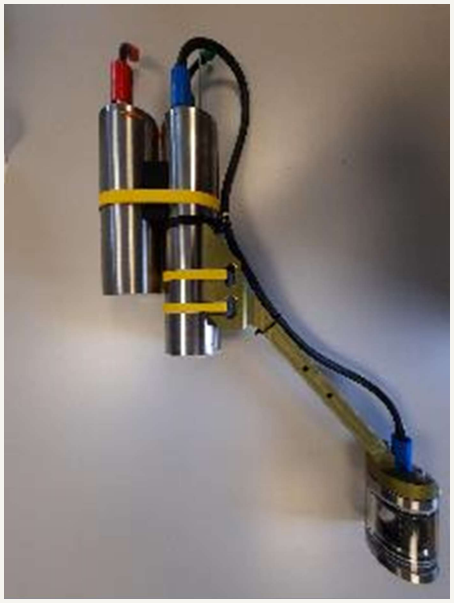
30 other co-occurring living and non-living categories

23200 for training & 10000 for testing



catrgory	train	test	
Actinopterygii	77	33	
Amphipoda	175	75	
Annelida	149	64	
Antennae	237	102	
Appendicularia_alive	101	43	
Appendicularia_dead	636	273	
Artefact	2100	900	
Calanidae	614	263	
Calanoida	2100	900	
Caligidae	2100	900	
Cavoliniidae	72	31	
Chaetognatha	400	172	
Copepoda	2100	900	
Creseidae	125	54	
Crystal	1400	600	
Ctenophora	143	61	
Detritus	2100	900	
Eumalacostraca	892	382	
Fiber	1400	600	
Fillament	1400	600	
Hydrozoa_L	331	142	
Hydrozoa_S	649	278	
Limacinidae	29	13	
Ostracoda	379	162	
Pluteus	60	26	
Reflection	1400	600	
Rhizaria	1400	600	
Salpida	246	106	
Scyphozoa	27	12	
Siphonoporae	83	35	
Tentacle	260	112	
	23185	9939	33124

Algorithm development: 2 approaches



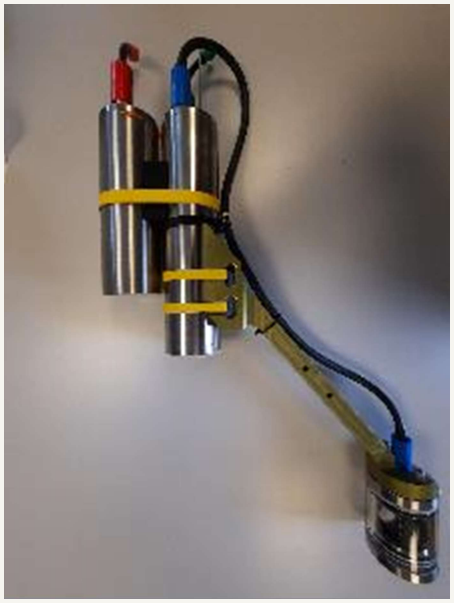
For embedded classification (power-efficient real-time onboard image processing)

Cloud data processing

Validation of the embedded classifications (high-performance image post processing)

Akvaplan niva

Algorithm development



Onboard identification
87% success rate

Cloud data processing

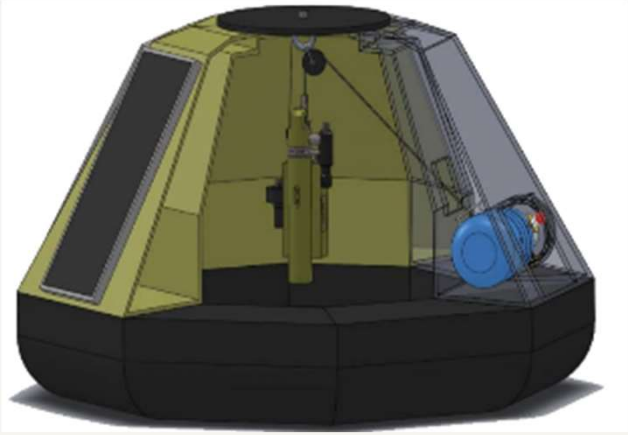
In cloud identification
98% success rate

Akvaplan niva

mooring development and field program

Smart buoy – SAIV AS APB5 mooring -

UVP 6 on cabled winch



Activities in 2024

FIELD TEST WITH MOORING IN TROMSØ JAN-FEBRUARY

FIELD DEPLOYMENT AT NOVA SEA-MARCH

DASHBOARD DEVELOPMENT: JAN-FEBRUARY

eLice
Real time detection of free-swimming sea lice

That was e_lice!

Akvaplan niva

VESO AQUA

KONGSBERG

MP Consulting

HYDROPTIC

NIVA

NOVA SEA