Hvar endar lorturin?

- betri umhvørvisráðlegging við botnfalsmyndlan

Birgitta Andreasen - *Vísindavøka á ferð 2024*

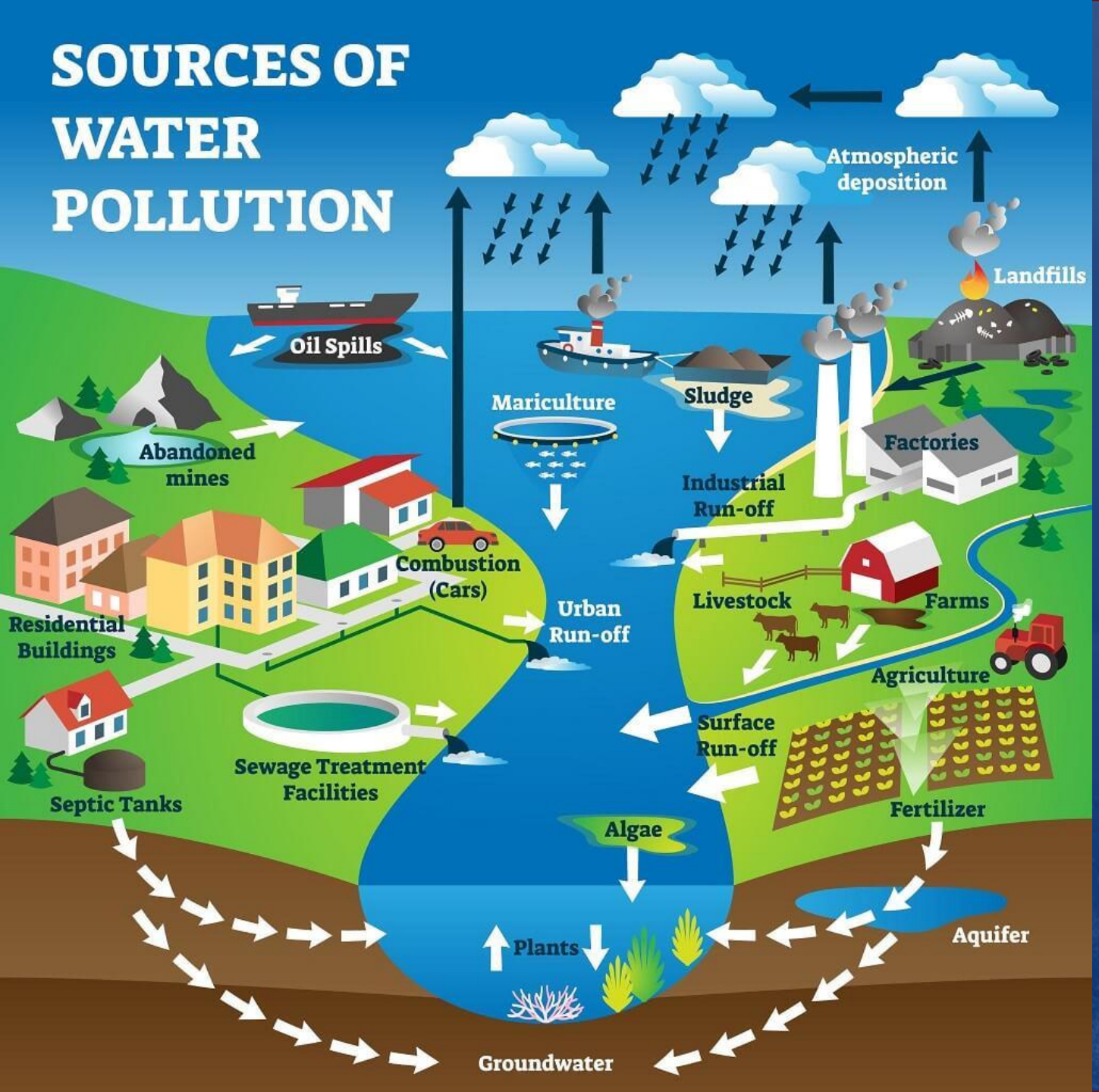
FIR UM

vitan til varandi aling

Skrá

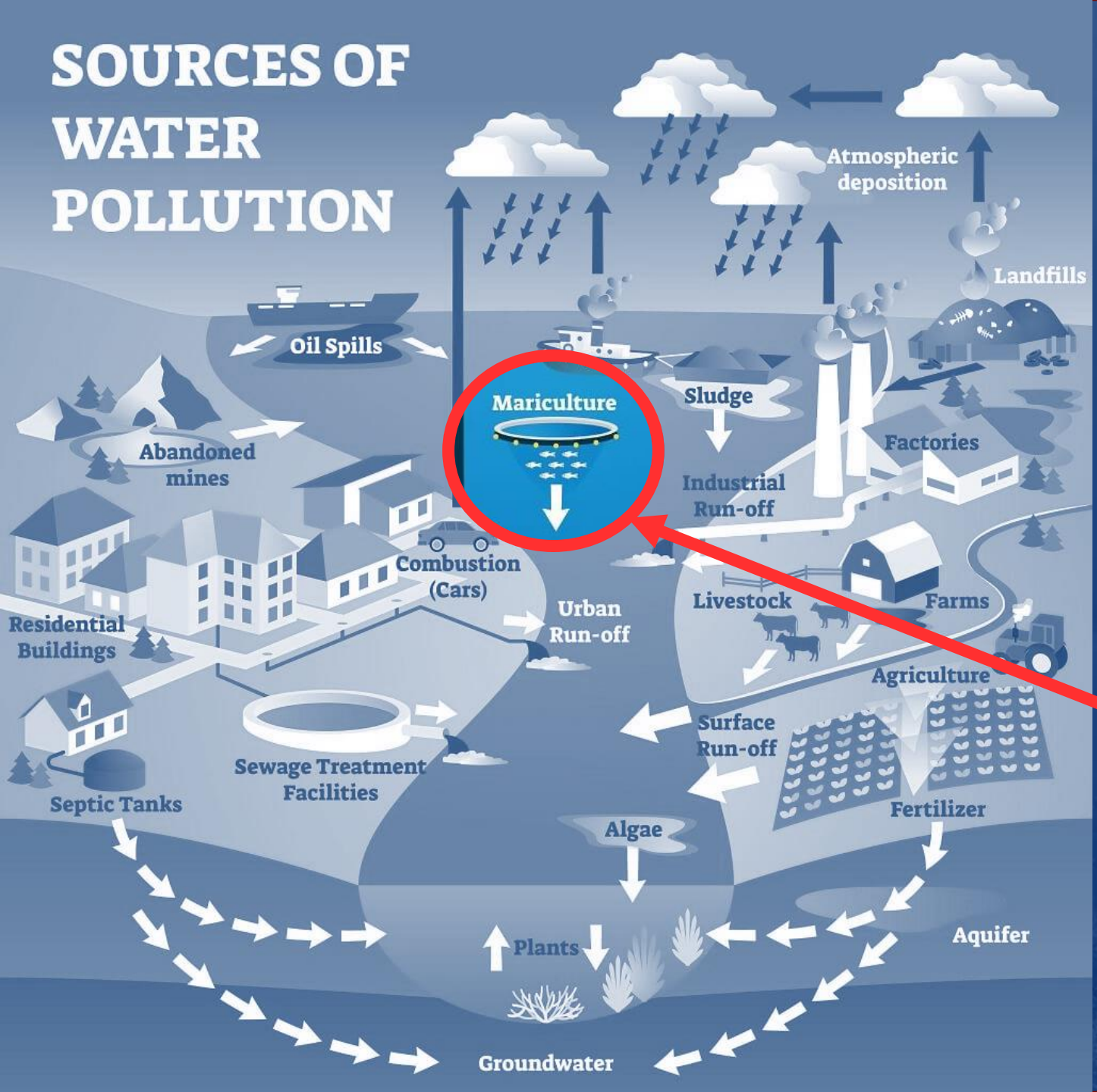
- Hvat fyri lortur?
- Bitlar av lívrunnum tilfari
- Bitlasporing
- Botnfalsmyndlar

- Verkætlanin ADepoPlan



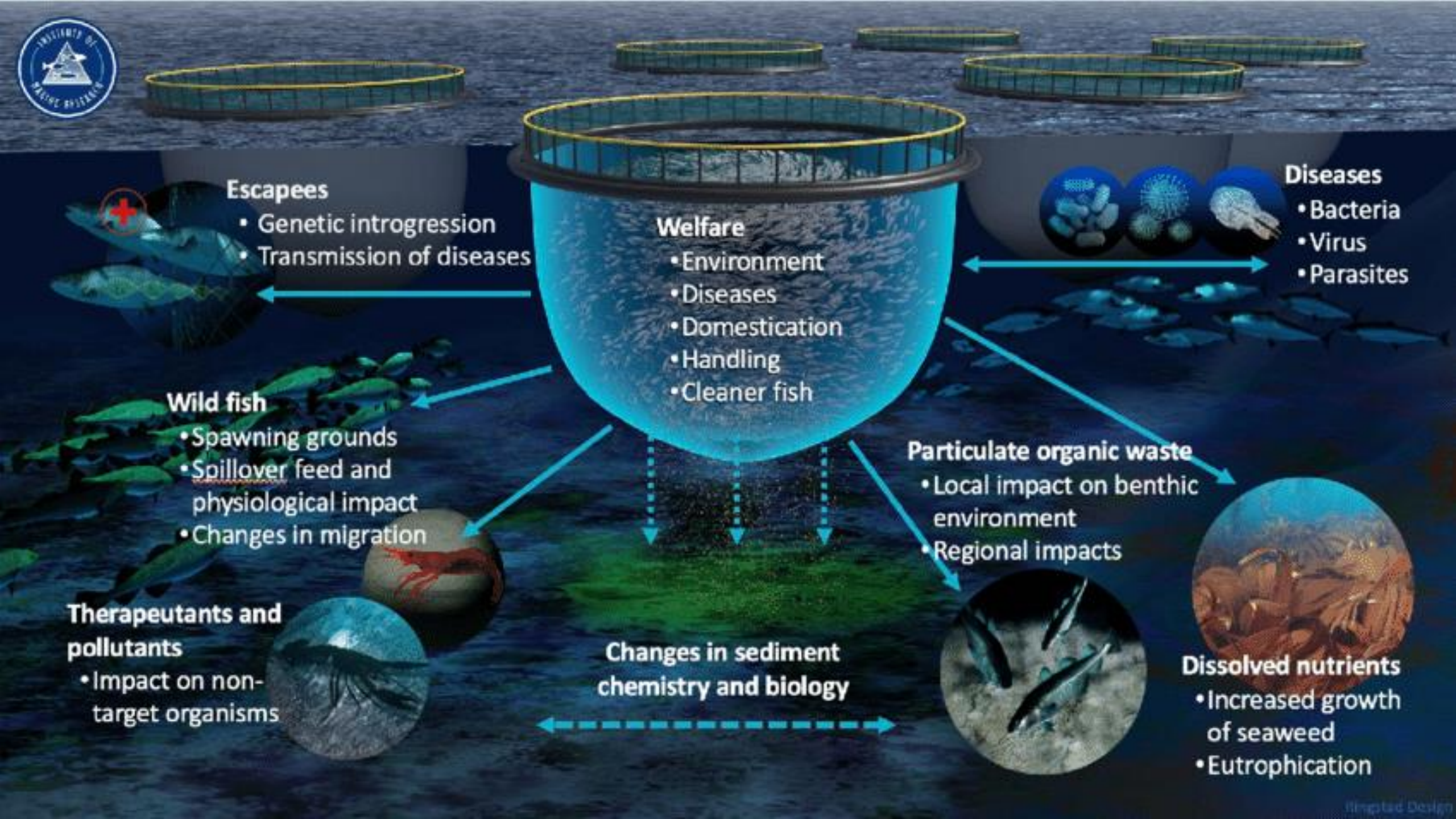
Nógvar dálkingarkeldur

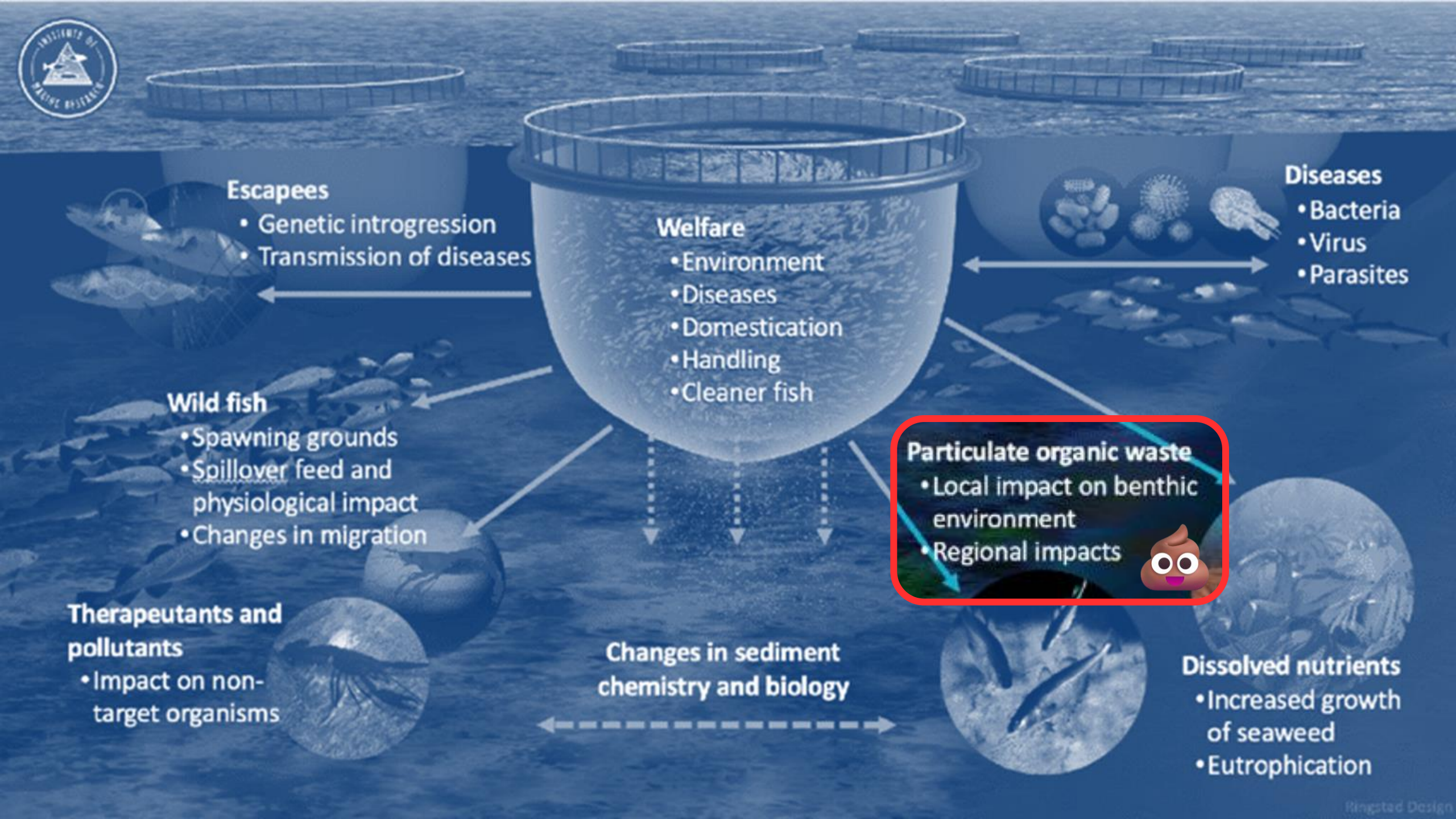
😔



Nógvar dálkingarkeldur

Laksaaling 💩


Escapees
• Genetic introgression
• Transmission of diseases
Welfare
• Environment
• Diseases
• Domestication
• Handling
• Cleaner fish
Diseases
• Bacteria
• Virus
• Parasites
Wild fish
• Spawning grounds
• Spillover feed and physiological impact
• Changes in migration
Particulate organic waste
• Local impact on benthic environment
• Regional impacts
Therapeutants and pollutants
• Impact on non-target organisms
Changes in sediment chemistry and biology
Dissolved nutrients
• Increased growth of seaweed
• Eutrophication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•Eutrophication

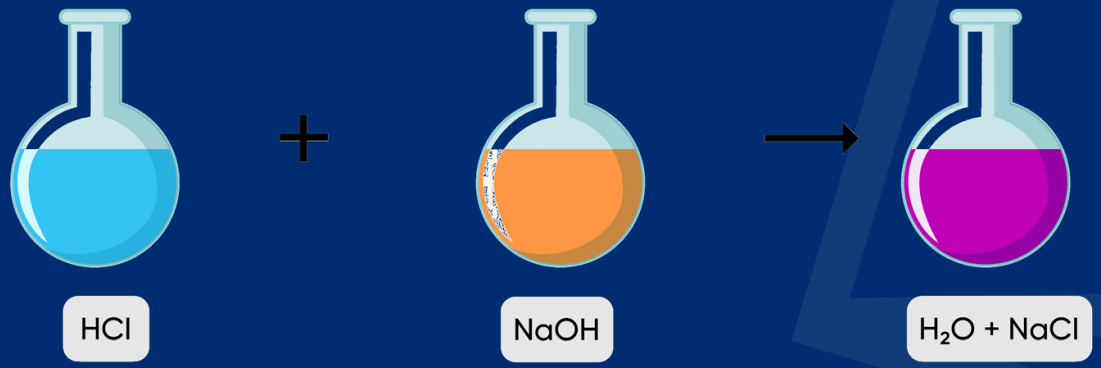
Bitlar av lívrunnum tilfari

Particulate Organic Matter (POM)

The Law of Conservation of Mass

- Matter is anything that has mass and takes up space.

- Matter can change form through physical and chemical changes, but through any of these changes matter is conserved.



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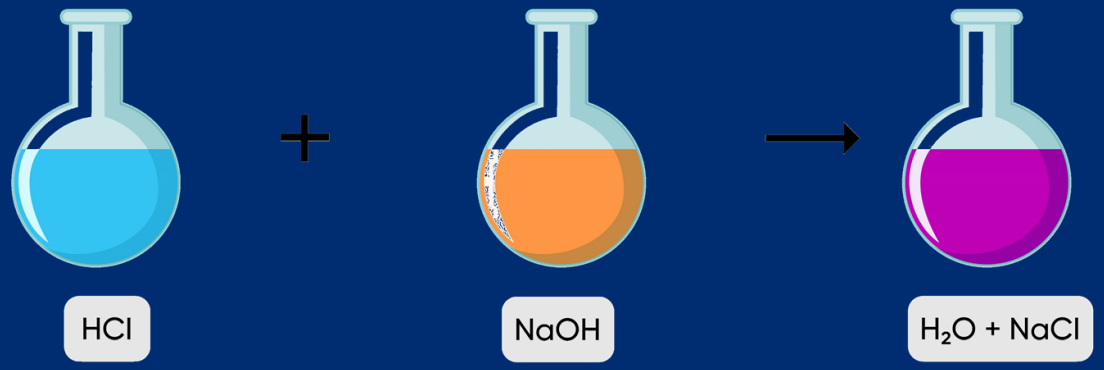


tvs. einki vit blaka út í náttúruna verður brádliga burtur!!

Massa balansu modellir

Fóður

Vøkstur

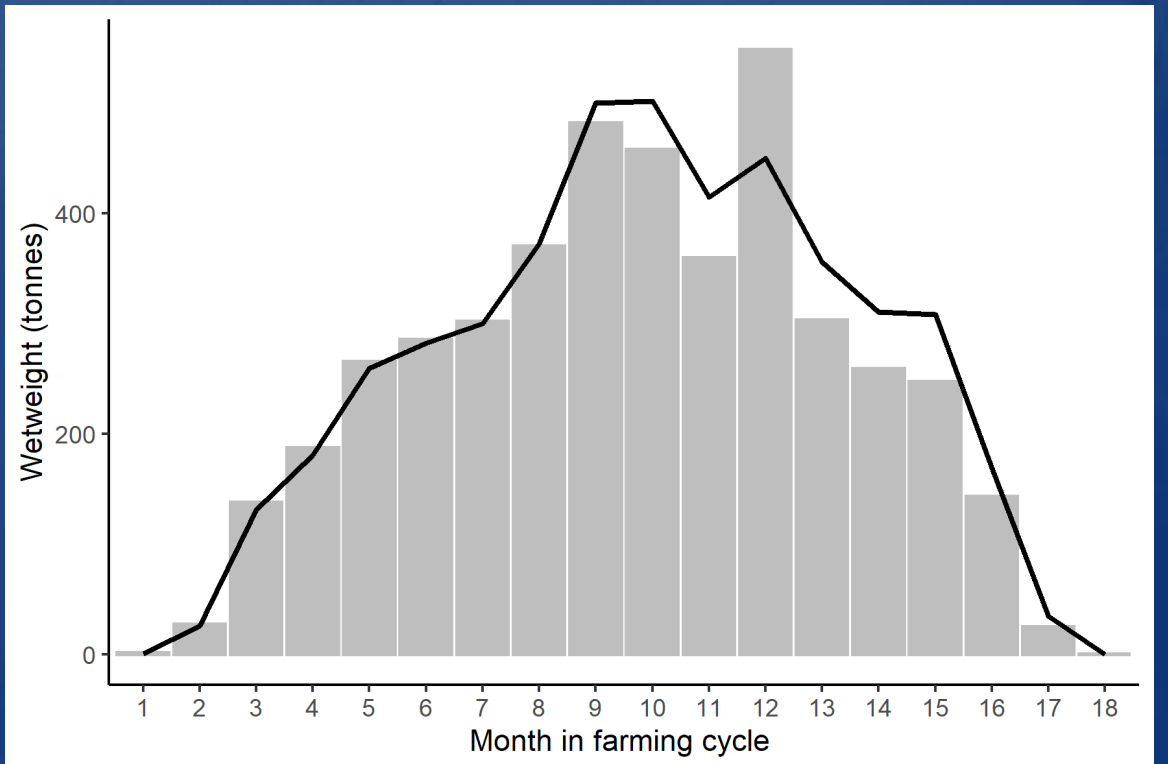
CO_2 + tøðsølt

Skarn 💩

Fóður og vøkstur

- Feed Conversion Ratio (FCR)

FCR_{bio} = **1.05** *máta í vátvekt*



FARMED SALMON IS A VERY RESSOURCE EFFICIENT SOURCE OF HEALTHY PROTEINS

		Farmed Atlantic Salmon	Chicken	Pig	Beef	Lamb
CARBON FOOTPRINT CO_2e PER KG PRODUCT	Lowest	3.24	3.52	3.44	23.92	21.00
LAND USE M^2/100 G PROTEIN	Lowest	3.7	7.1	11	102	185
FEED CONVERSION RATIO (KG)	Highest	1.2 - 1.5	1.7-2	2.7-5	6-10	No data
WATER FOOTPRINT LITER / KG EDIBLE MEAT	Lowest	2,000	4,200	6,000	15,000	No data
EDIBLE YIELD EDIBLE MEAT PER KG FEED	Highest	68%	46%	52%	No data	38%

CO_2 figures only for farming/production stages. Source: WWF Sverige, Carboncloud & GSI

Nitrogen (N) og fosfor (P) máta í turrvekt

Feed
4599 t feed
- 273 t N
- 40.5 t P

Feed consumed by fish
4461 t feed
- 265 t N (97%)
- 39.3 t P (97%)

Incorporated in biomass
4400 t fish
- 132 t N (48%)
- 18 t P (44%)

Feed loss
138 t feed
- 8.2 t N (3%)
- 1.2 t P (3%)

Particulate organic waste (feces):
- 18.5 t N (7%)
- 14 t P (35%)

Dissolved inorganic waste:
- 114 t N (42%)
- 7 t P (17%)

Total particulate waste:
- 26.7 t N (10%)
- 15.2 t P (38%)

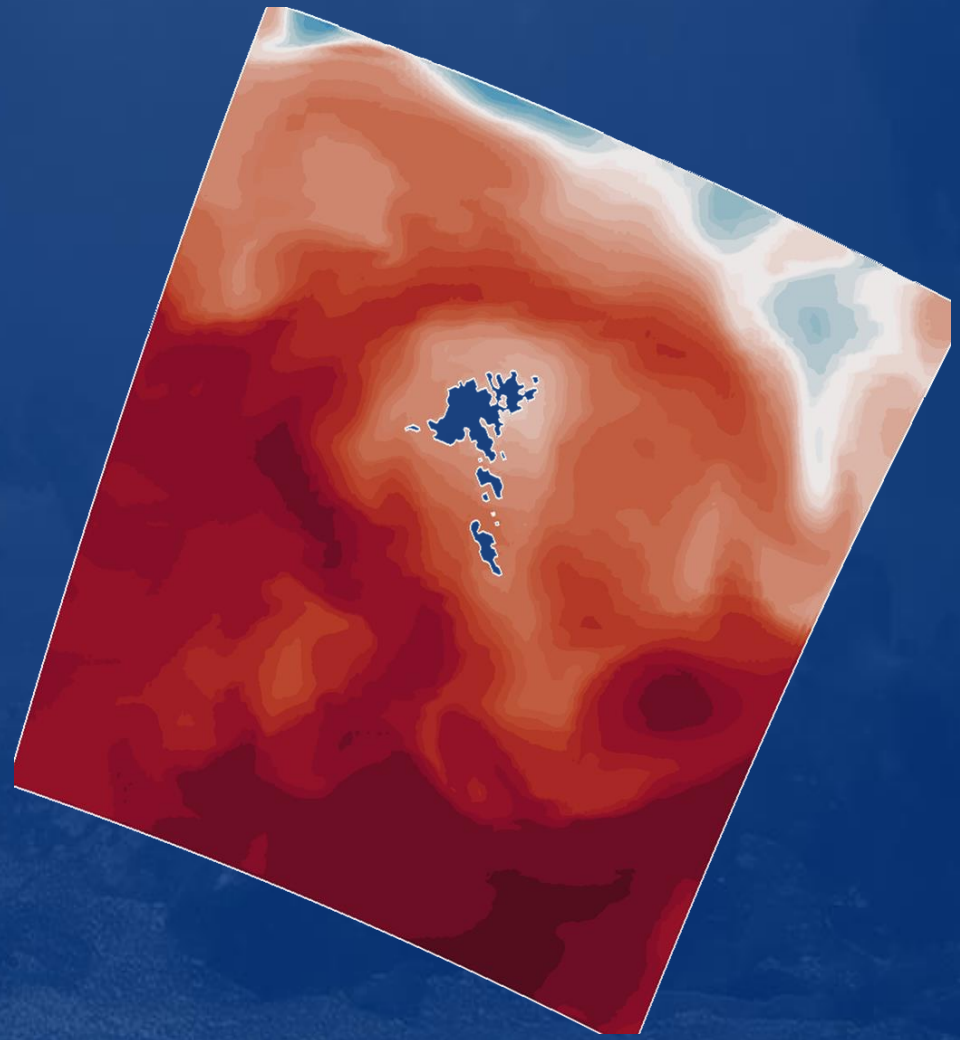
Total amount lost:
- 141 t N → ~52%
- 22.4 t P → ~55%

Árini er knýtt at umhvørvinum

- Rímiliga lætt at meta um útlát

- Verri at spáa um árini á umhvørvið
- Nógvir faktorar spæla inn:
  - Skap á fjørðinum
  - Streymviðurskifti
  - Viðurskifti til gróður
  - osfr.

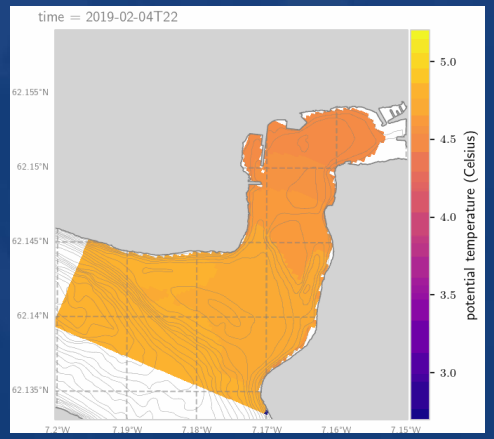
→ Umhvørviseftiransing!!



Bitlasporing

Particle tracking

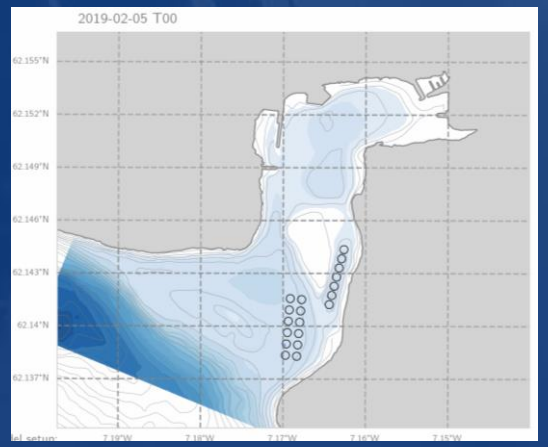
Bitlasporing heilt einkult



Hydrodynamic model

Havmyndil

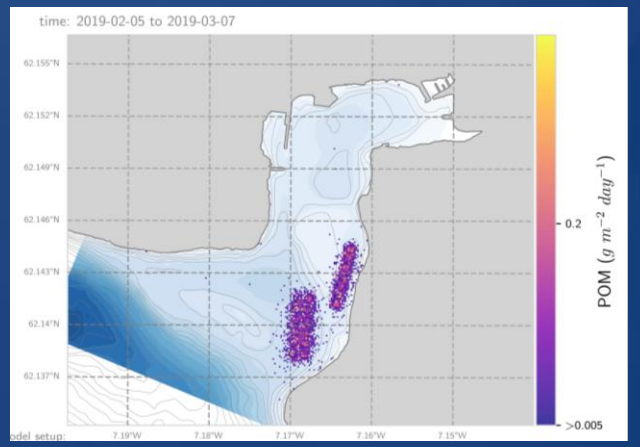
+



Lagrangian particle tracking model

Bitlasporingsmodel

→



Connectivity matrix/ networks/concentrations

Næsta position = **fyrra position** + **flutningur** ± atburður ± søkkiferð ± random walk

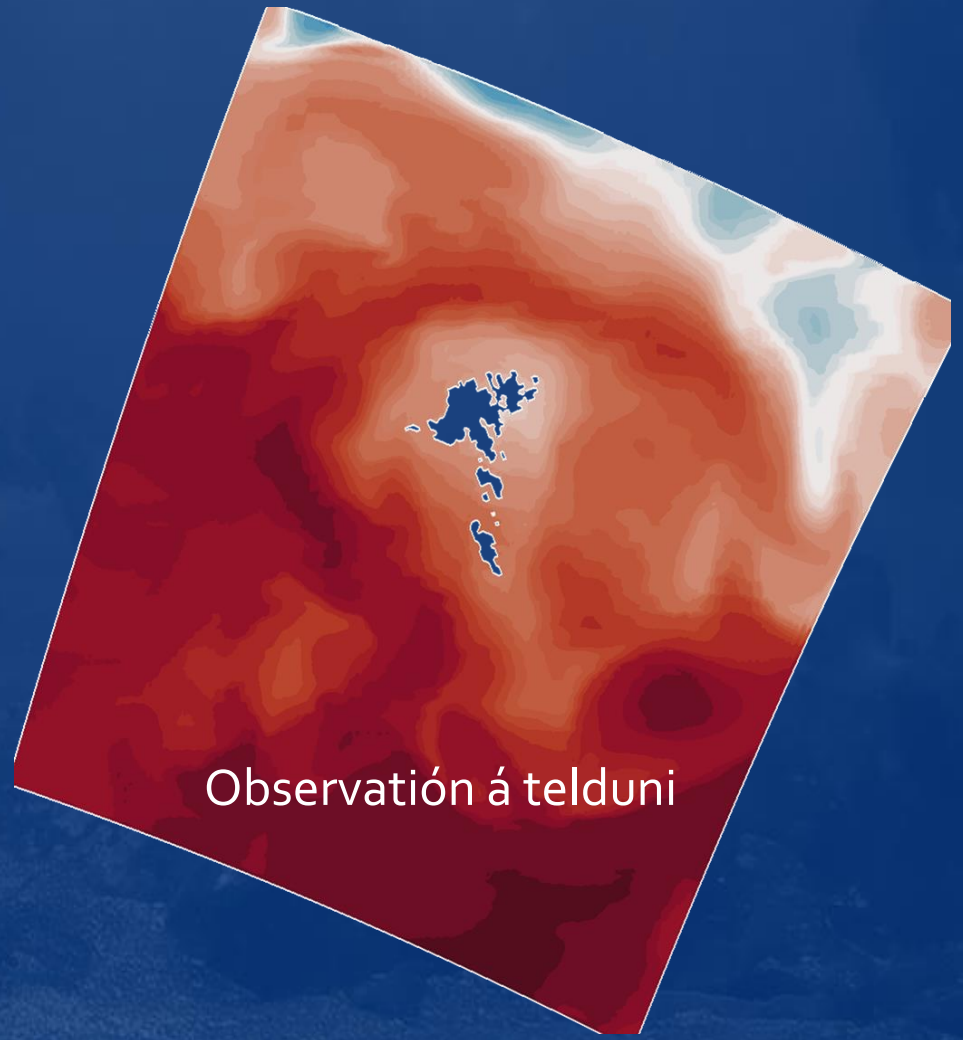
Ferð (m/s) · tíðarskritt (s)

Eginleikar hjá bitlinum

Mátingar

Observatión í náttúruni

3D havmyndil



Observatión á telduni

Botnfalsmyndlar

Deposition models

Botnfalsmyndil, *heilt einkul!*

(Cromey et al. 2002)
Skarn søkkur við 3.2 cm/sek
Fóður søkkur við 10 cm/sek
Tilfarið spjaðist við streyminum ímeðan tað søkkur

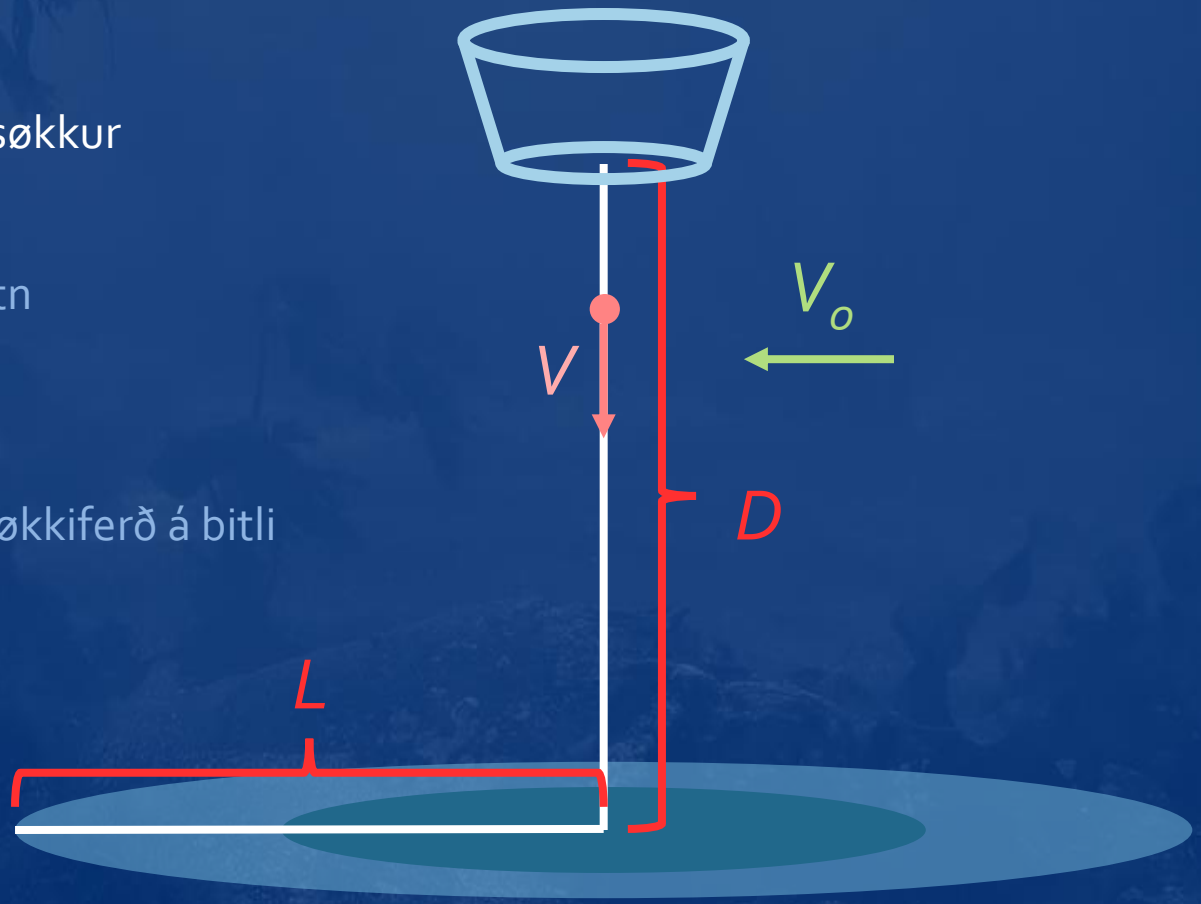
Spjaðingslongd

Fjarstøða nót til botn

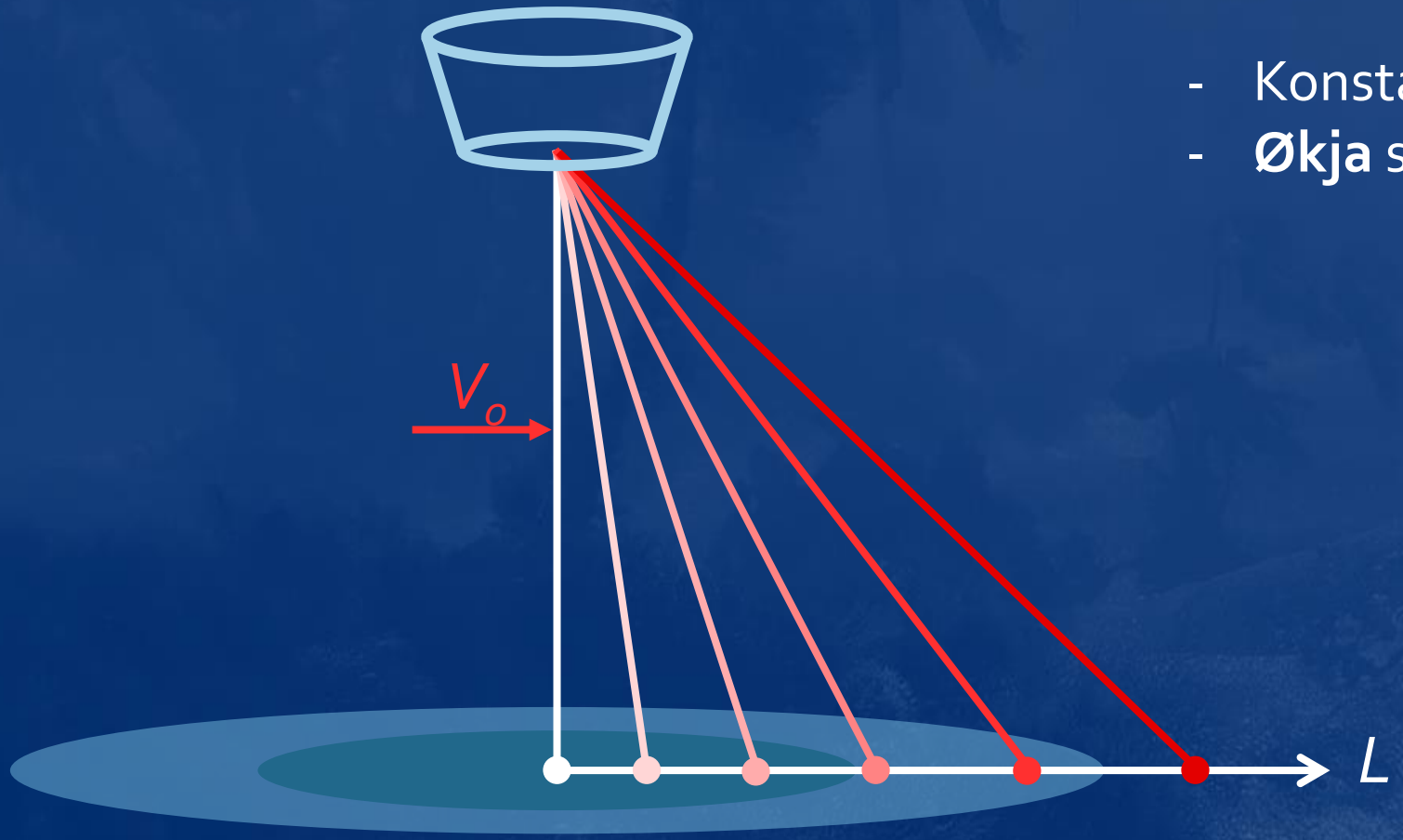
$$L = V_0 \cdot \frac{D}{V}$$

Søkkiferð á bitli

Miðal streymferð frá nótini til botn

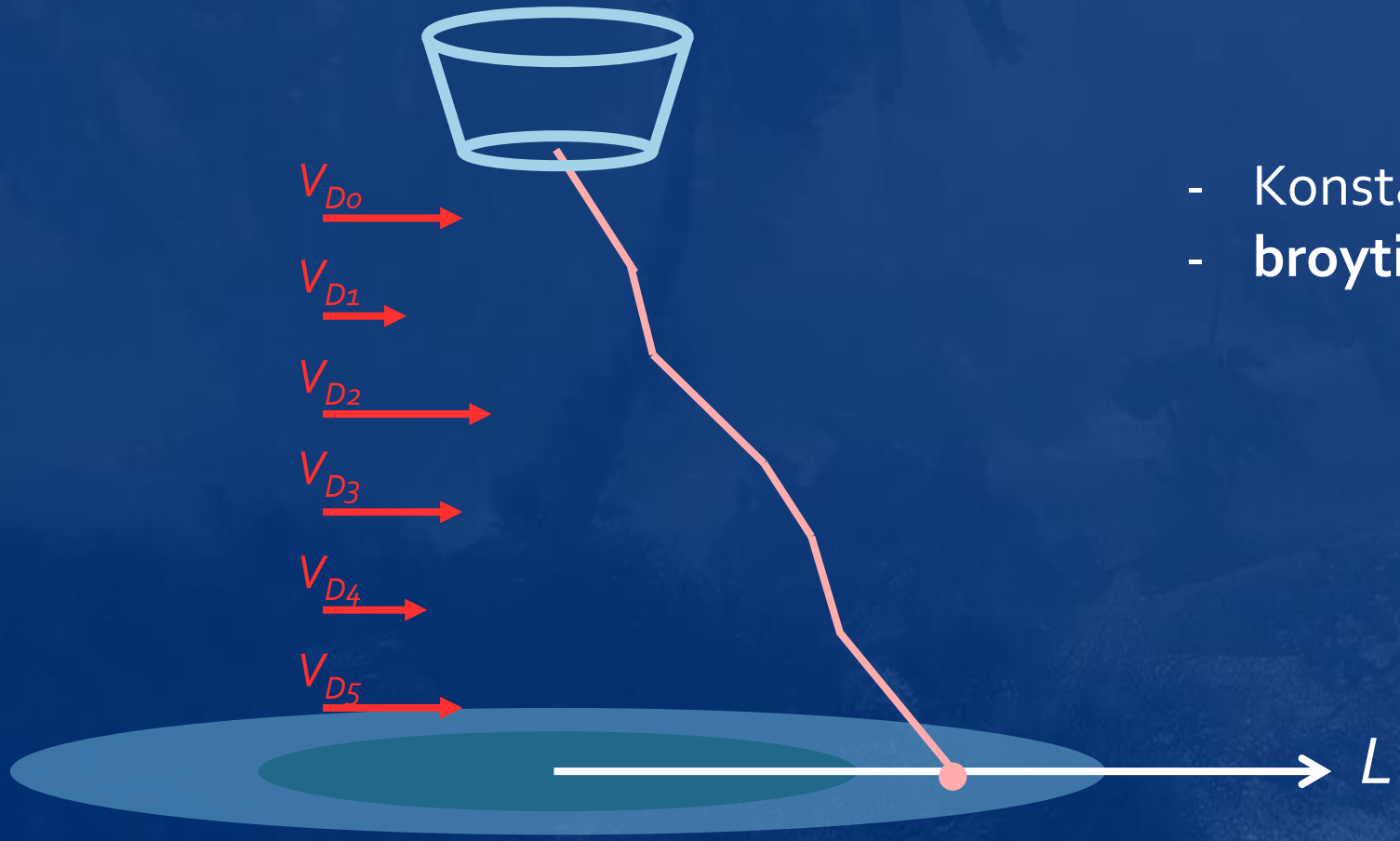


Streymferðin er tann sama á øllum fjørðinum



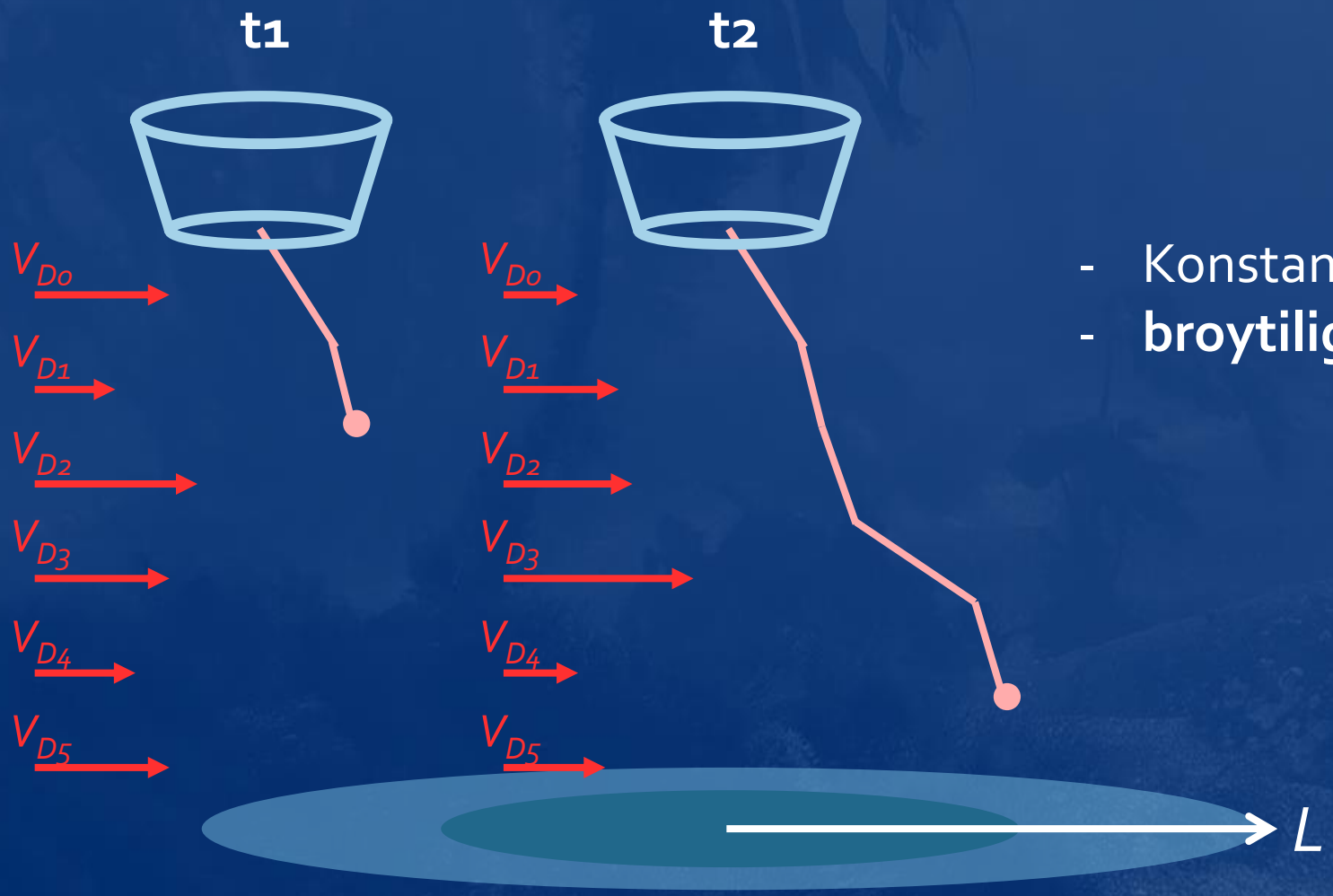
- Konstant søkkiferð (V) og dýpi (D)
- **Økja** streymferðina (V_o)

Streymferðin broytist gjøgnum dýpið



- Konstant søkkiferð (V) og dýpi (D)
- **broytilig** streymferð (V_o)

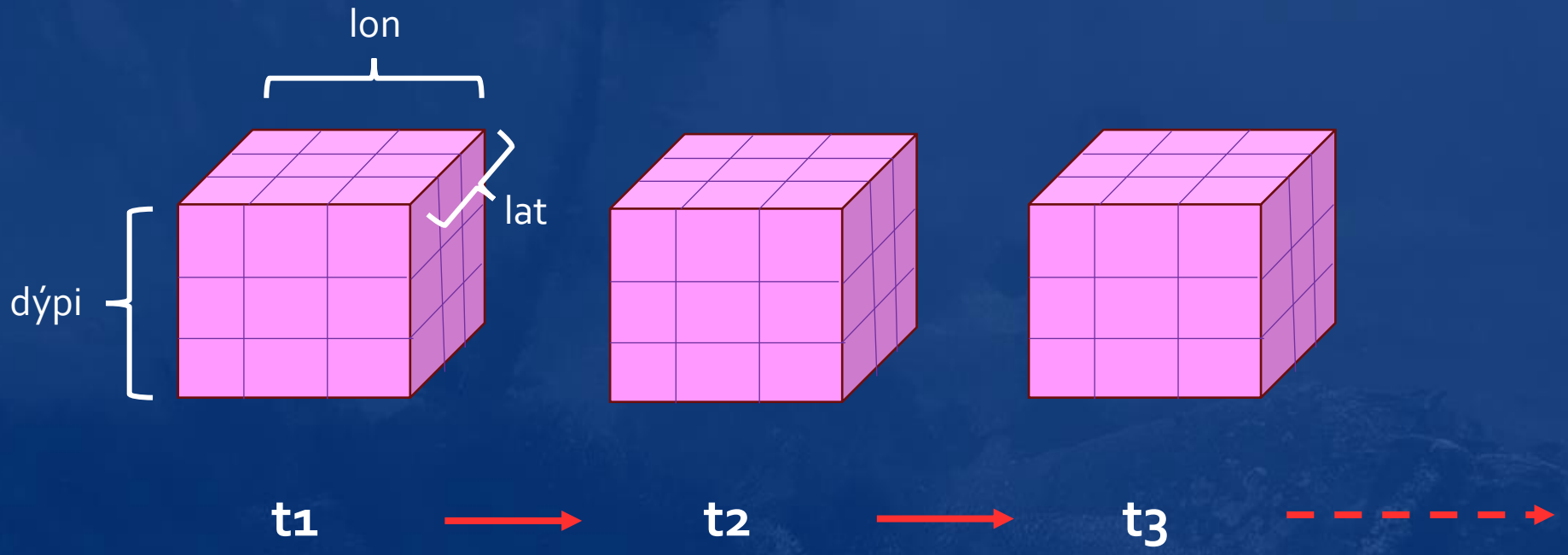
Streymferðin broytist gjøgnum **dýpi** og **tíð**



- Konstant søkkiferð (*V*) og dýpi (*D*)
- **broytilig** streymferð (V_o)

Streymferðin broytist gjøgnum **dýpi** og **tíð** og **stað**

- Konstant søkkiferð (V) og dýpi (D)
- **broytilig** streymferð (V_o)



ADepoPlan

Accessible deposition modelling tools for improved environmental planning

Samstarvspartar:

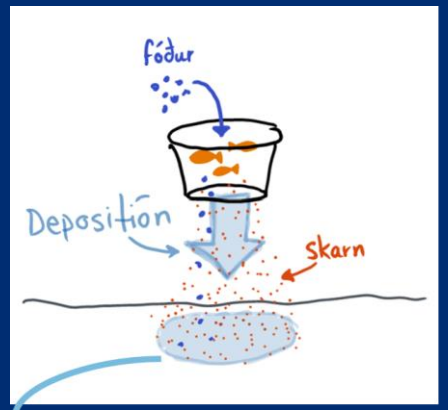
FIR UM
vitan til varandi aling

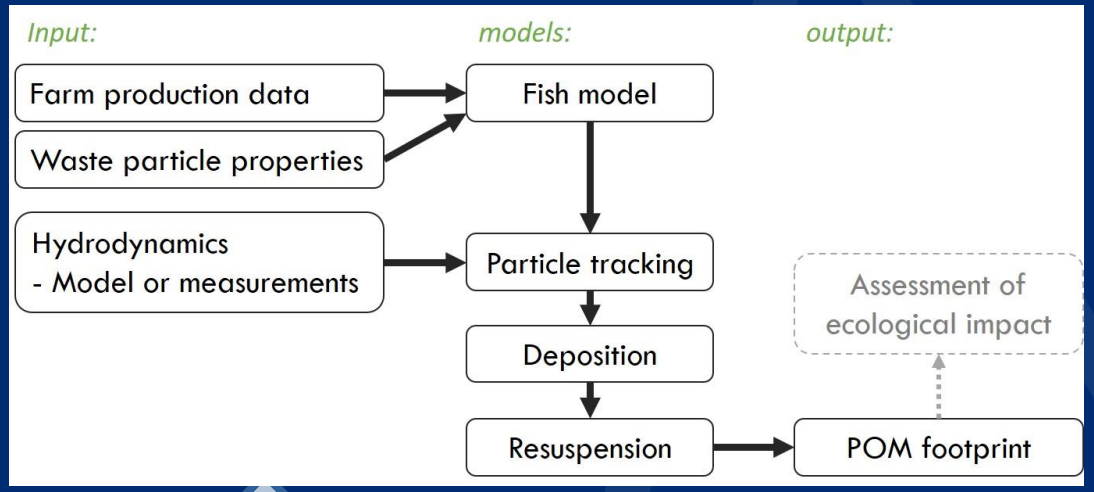
HAVFORSKINGS INSTITUTTET

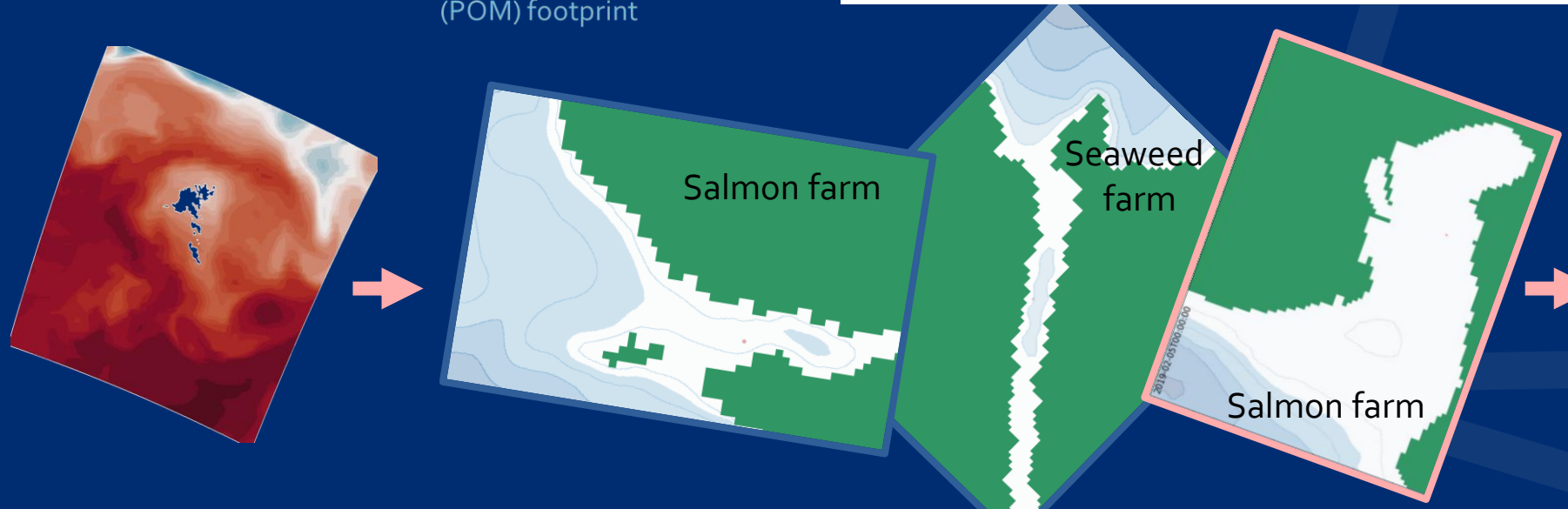
Vikmar

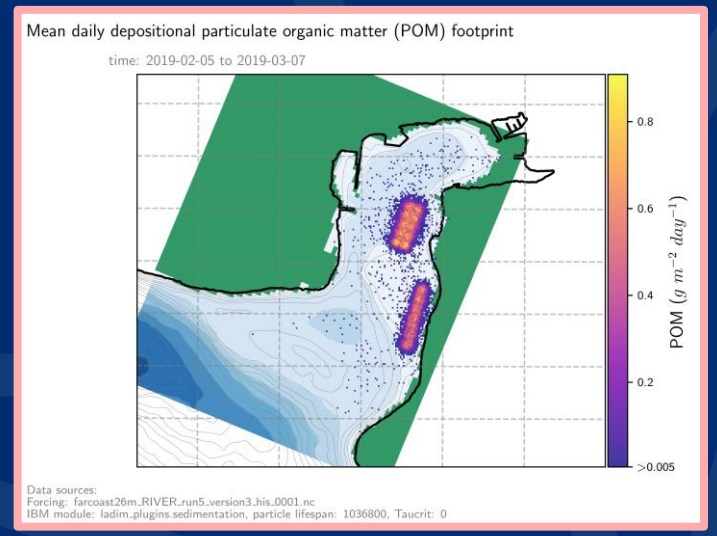
ADepoPlan → *modelling, validation and accessability*

Accessible deposition modelling tools for improved environmental planning









WP1

Modelling

Data input:

FarCoast

Current Measurement

Protocols for modelling and data analysis

WP3

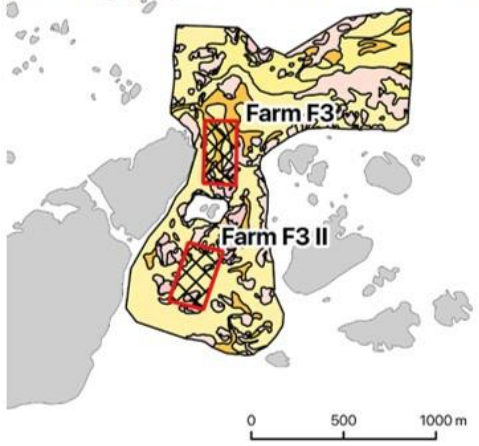
Software application prototype

WP4

Dissemination

WP2

Seabed survey (multibeam echosounder)



Sediment sampling

Sediment sampling + Seabed survey

Max production

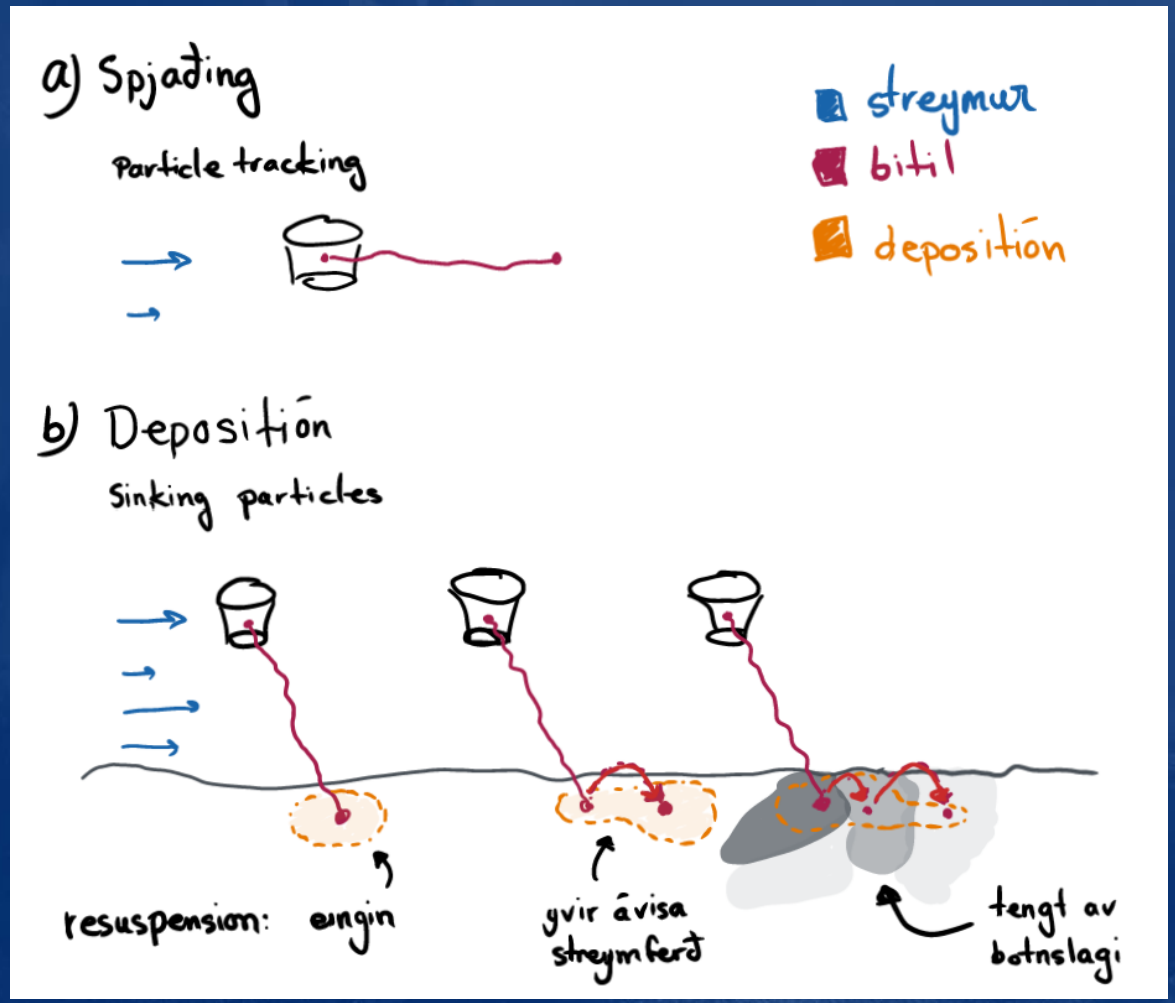
Reference – before start of production

Modelling and programming

Sampling

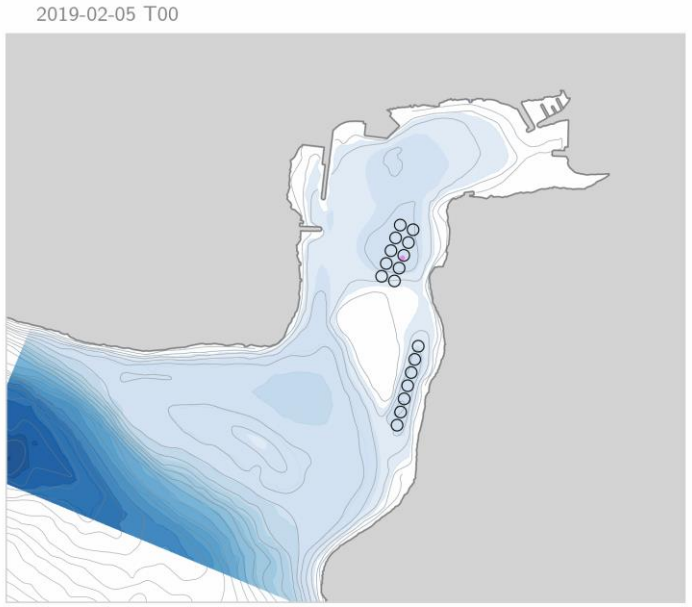
Validation

Resuspensión – *super simplified …*



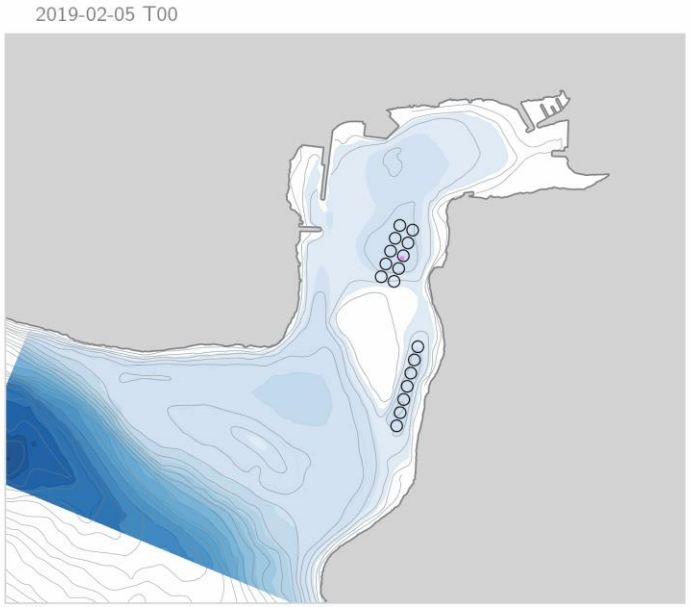
Resuspensión

eingin



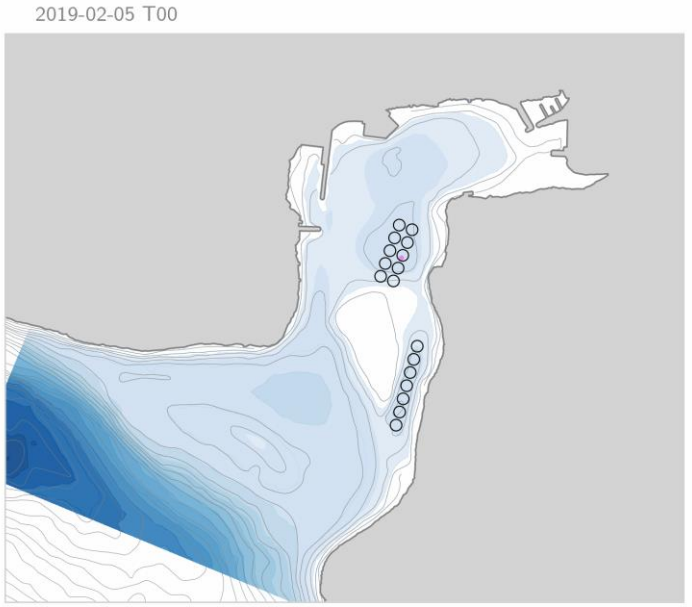
M model setup:
g: farcoast26m_RIVER_run5_version3_his_0001.nc
module: ladim_plugins.sedimentation, particle lifespan: 12.0 days, Taucrit: 1000
l timestep: 60 s, output: 24 h

"standard"



LADiM model setup:
Forcing: farcoast26m_RIVER_run5_version3_his_0001.nc
IBM module: ladim_plugins.sedimentation, particle lifespan: 12.0 days, Taucrit: 0.018
Model timestep: 60 s, output: 24 h

alt

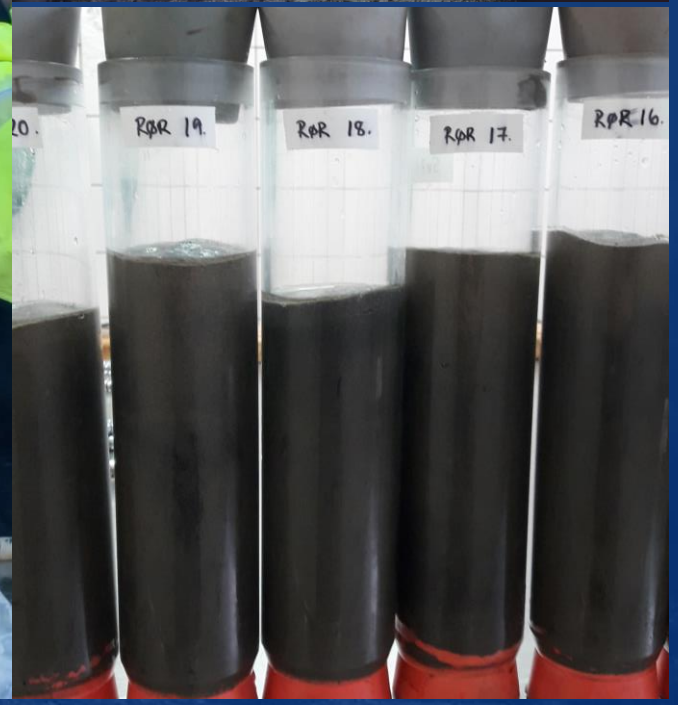


LADiM model setup:
Forcing: farcoast26m_RIVER_run5_version3_his_0001.nc
IBM module: ladim_plugins.sedimentation, particle lifespan: 12.0 days, Taucrit: 0
Model timestep: 60 s, output: 24 h

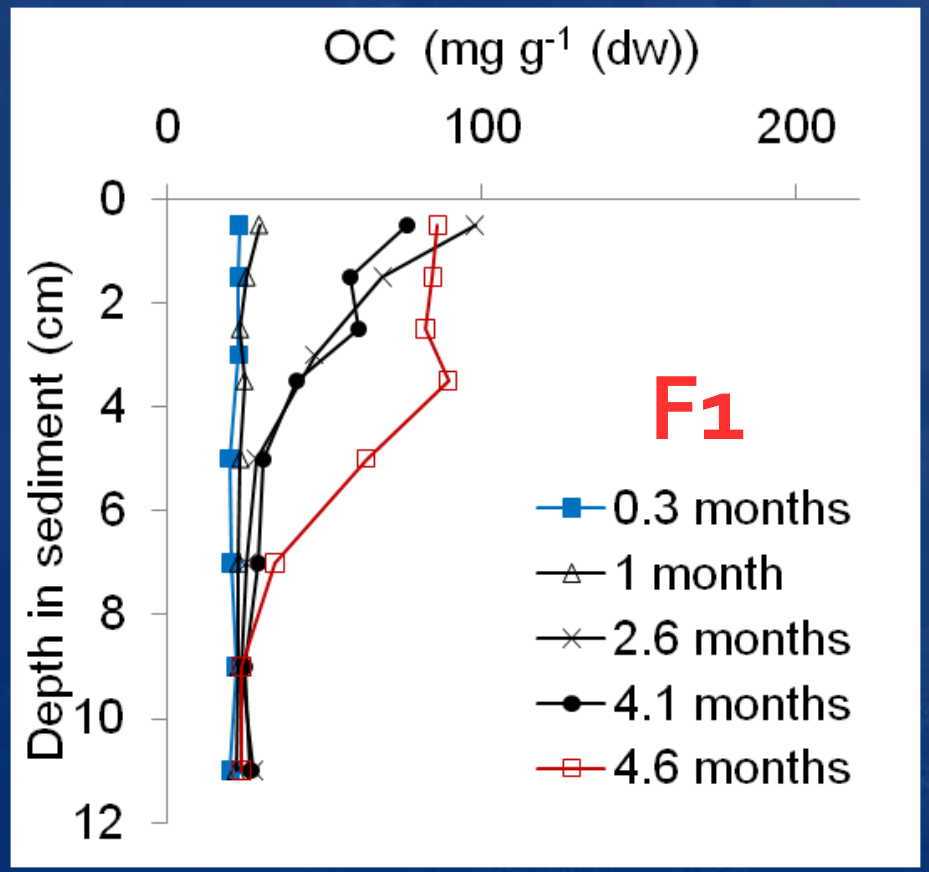
Hvussu samsvarar?

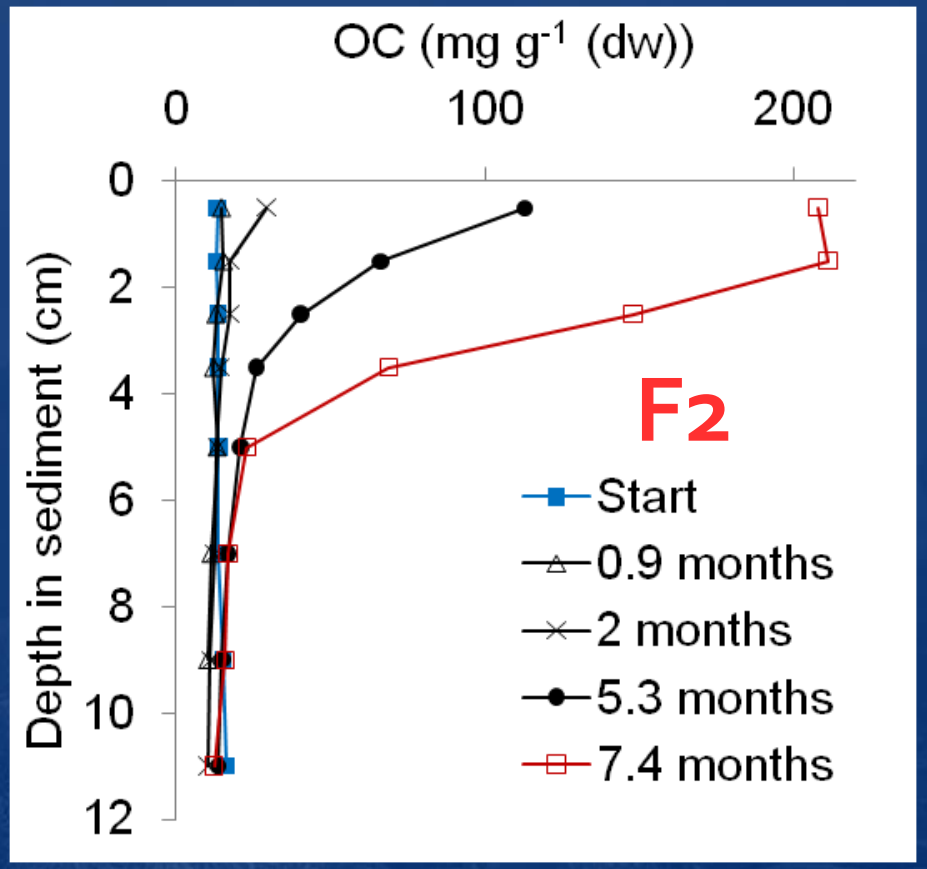
Validation studies

Sediment kjarnir

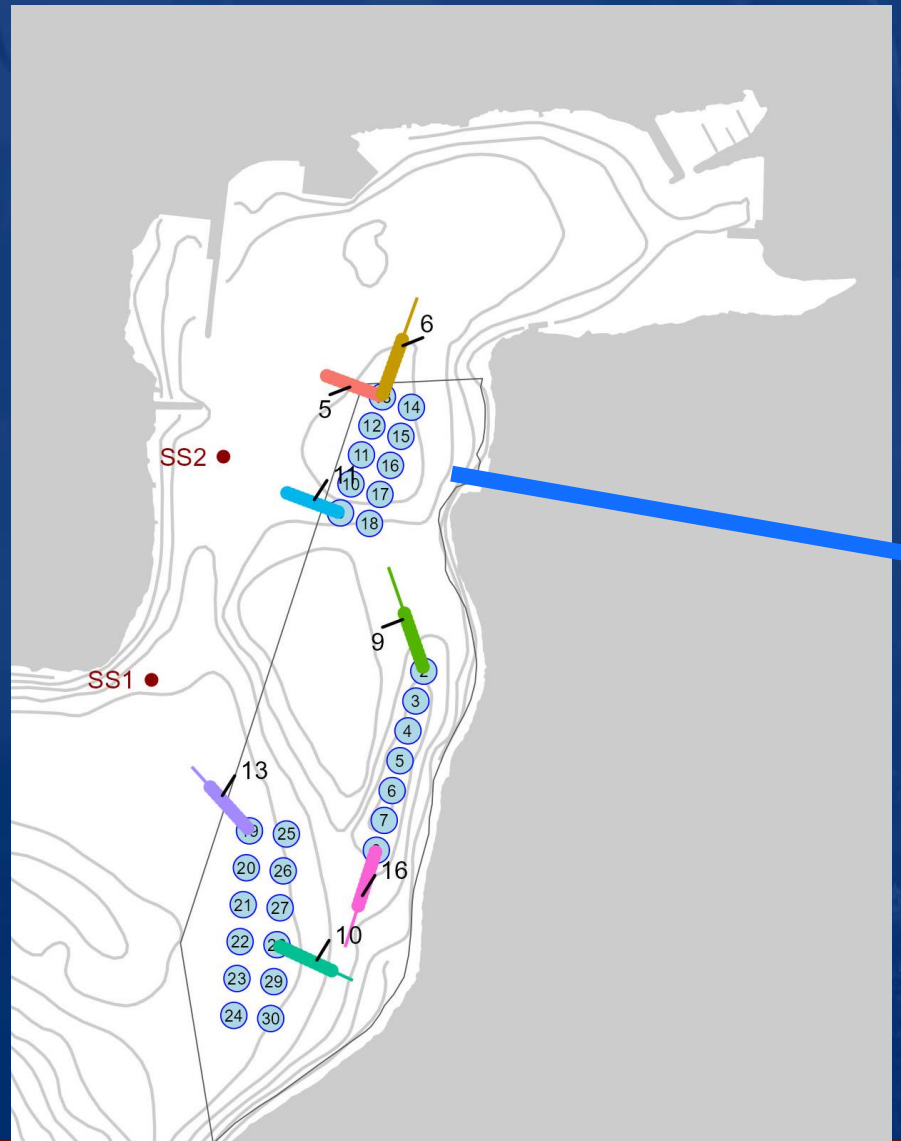


Organic Carbon in sediment

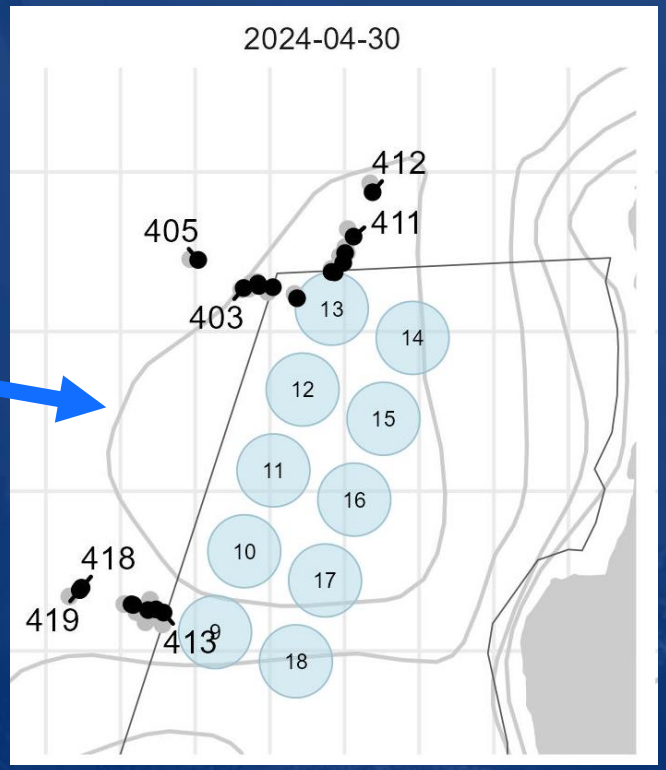




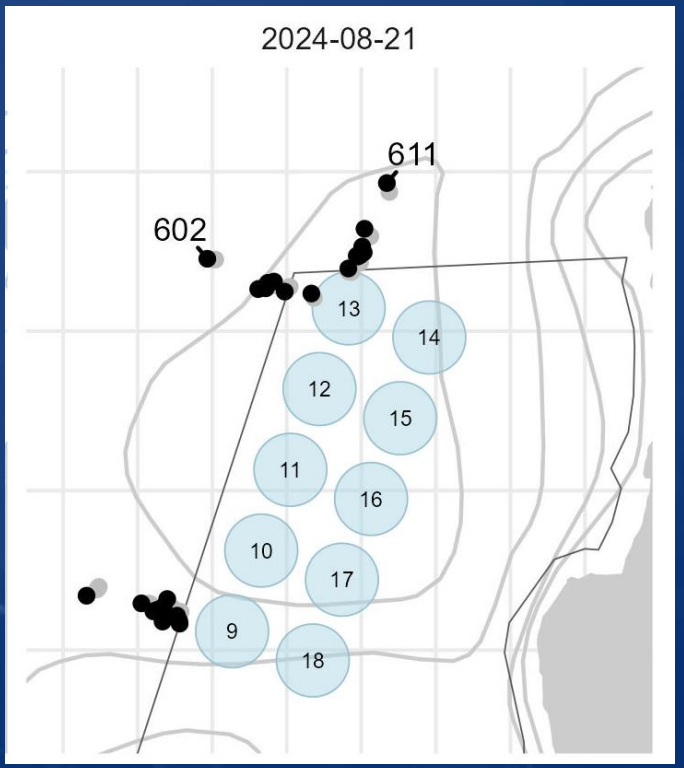
ADepoPlan Sýnistøka



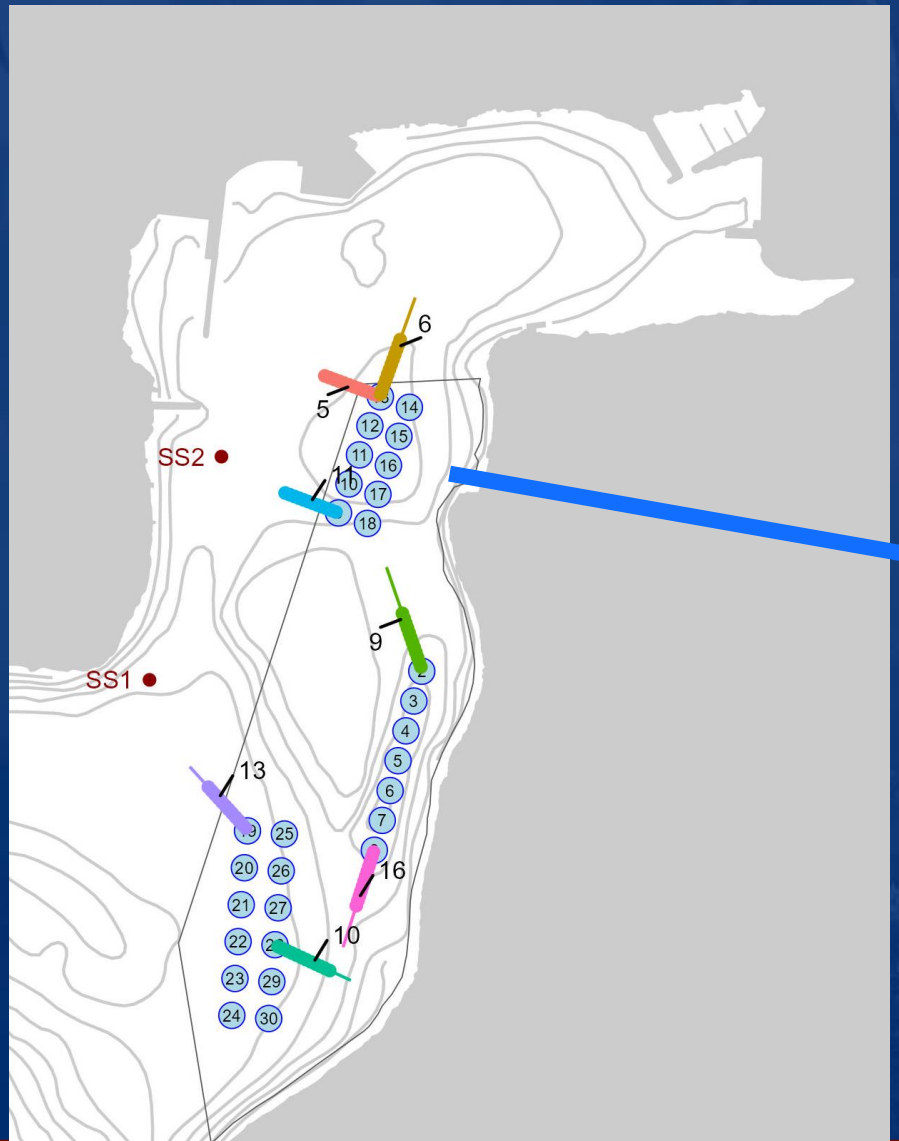
Áðrenn fiskur verður settur út



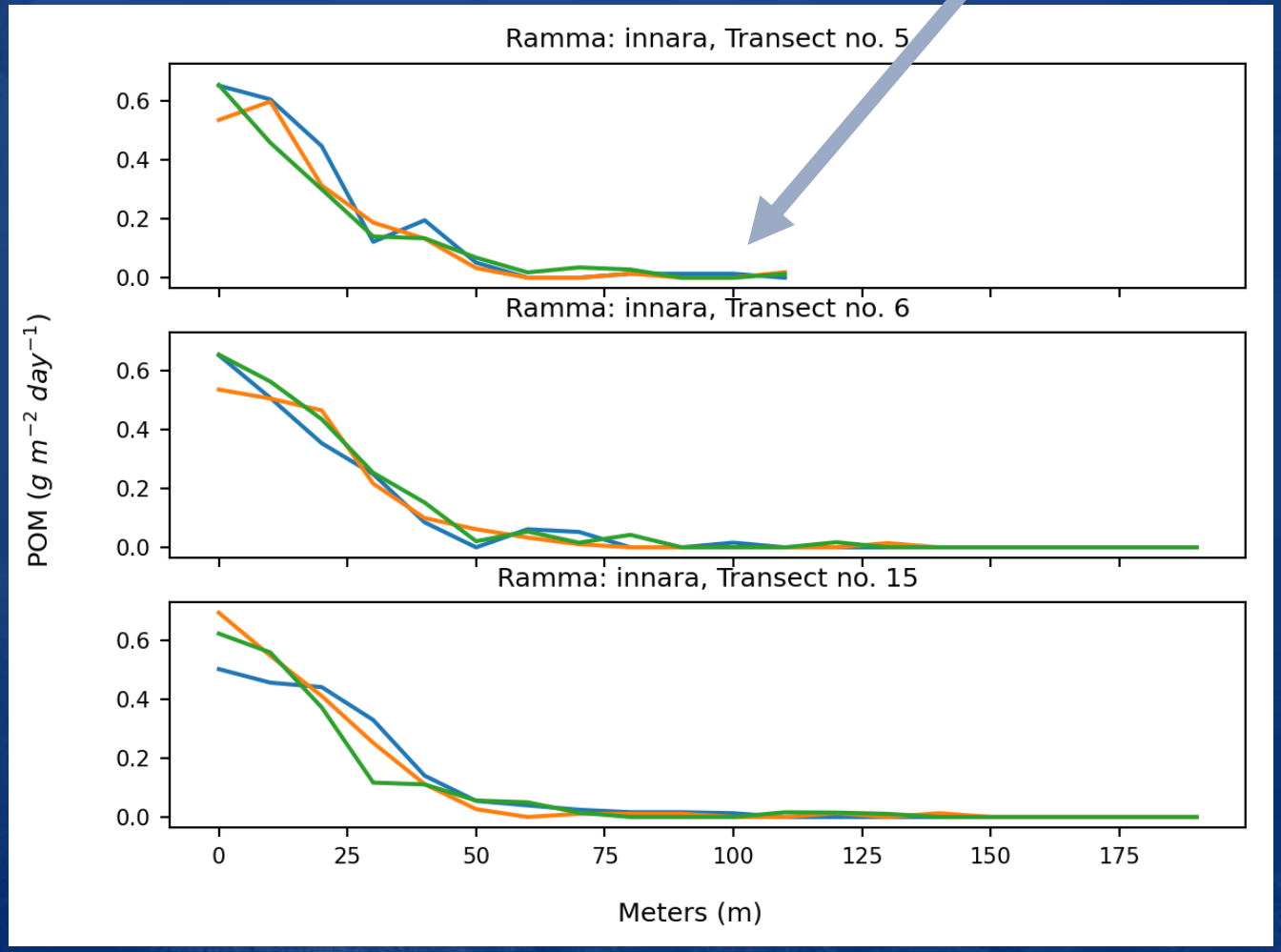
Største biomassa



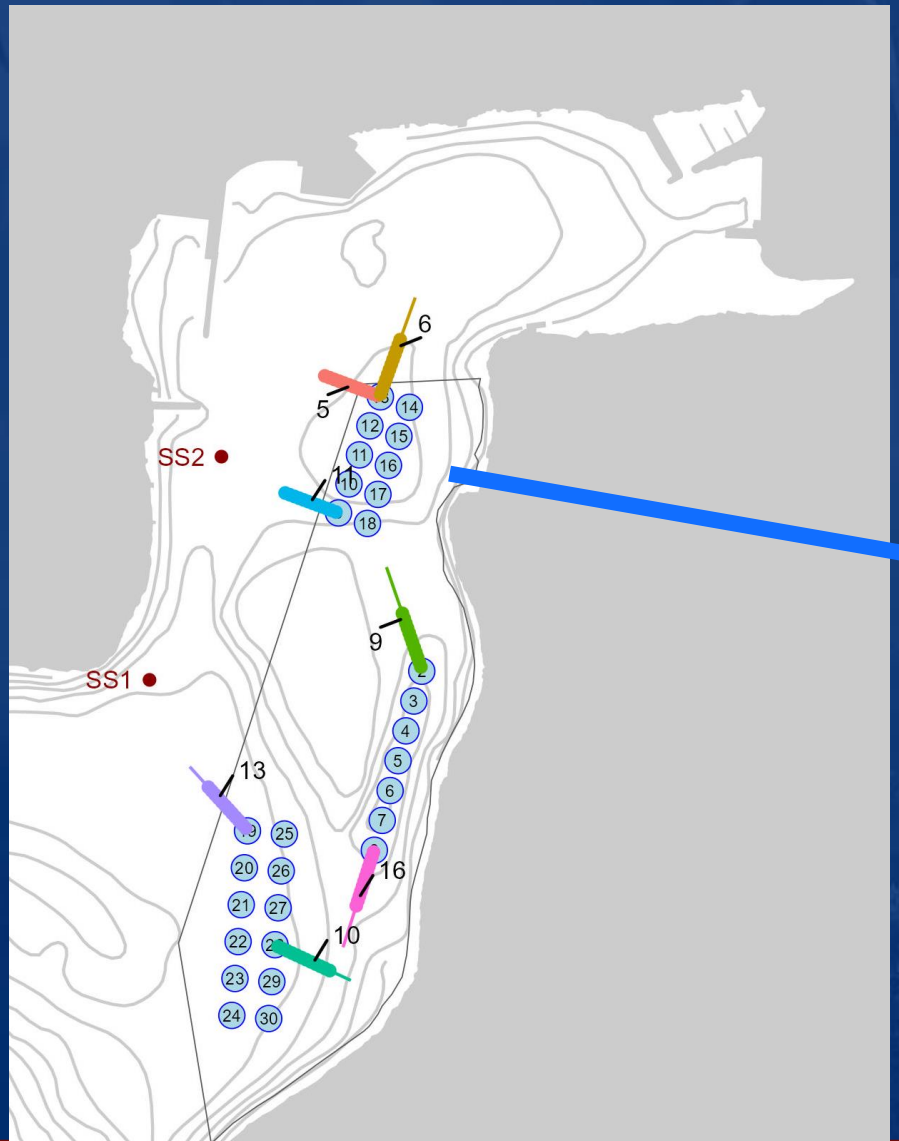
ADepoPlan Sýnistøka



Model úrslit

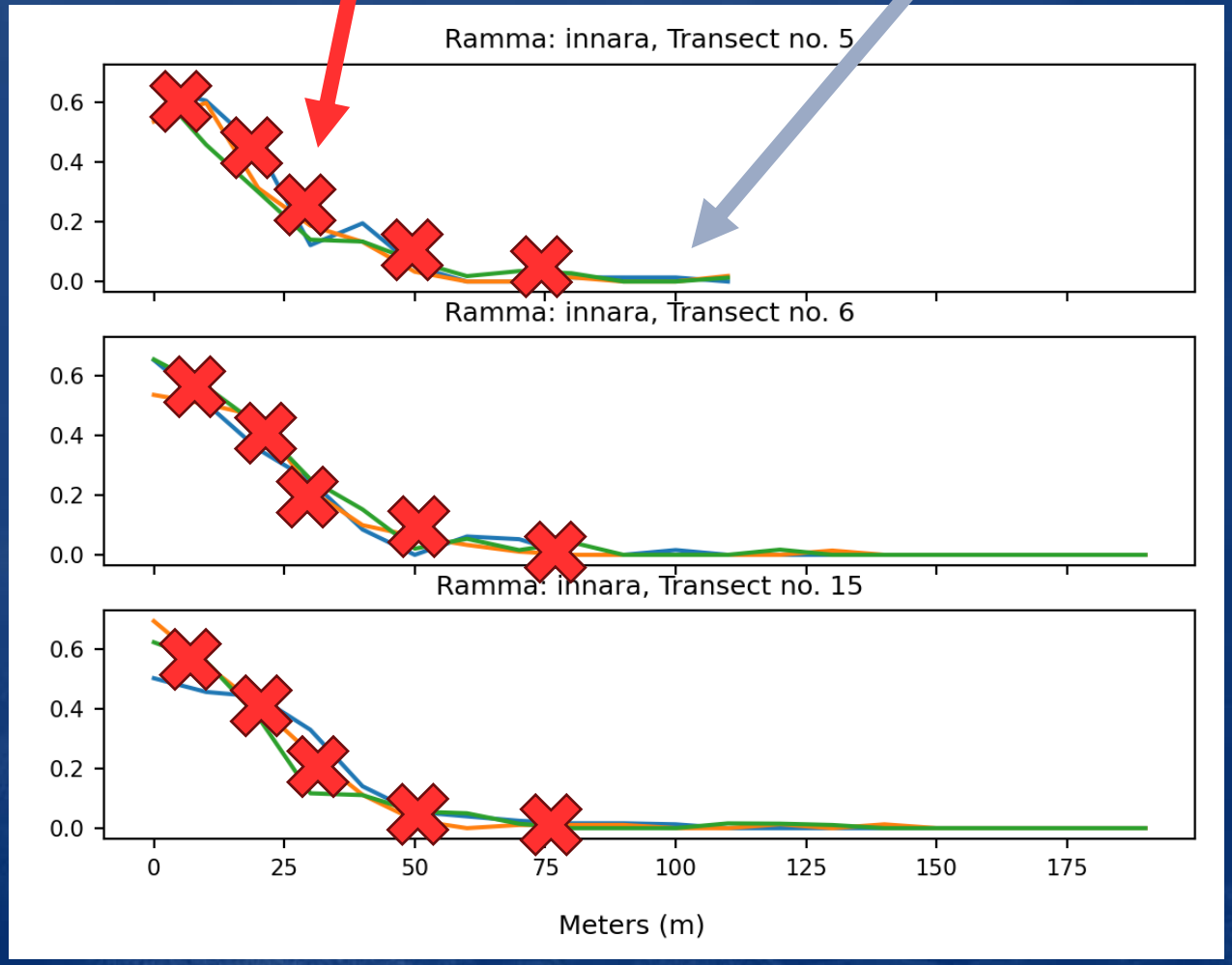


ADepoPlan Sýnistøka



Mátingar úrslit klár í 2025

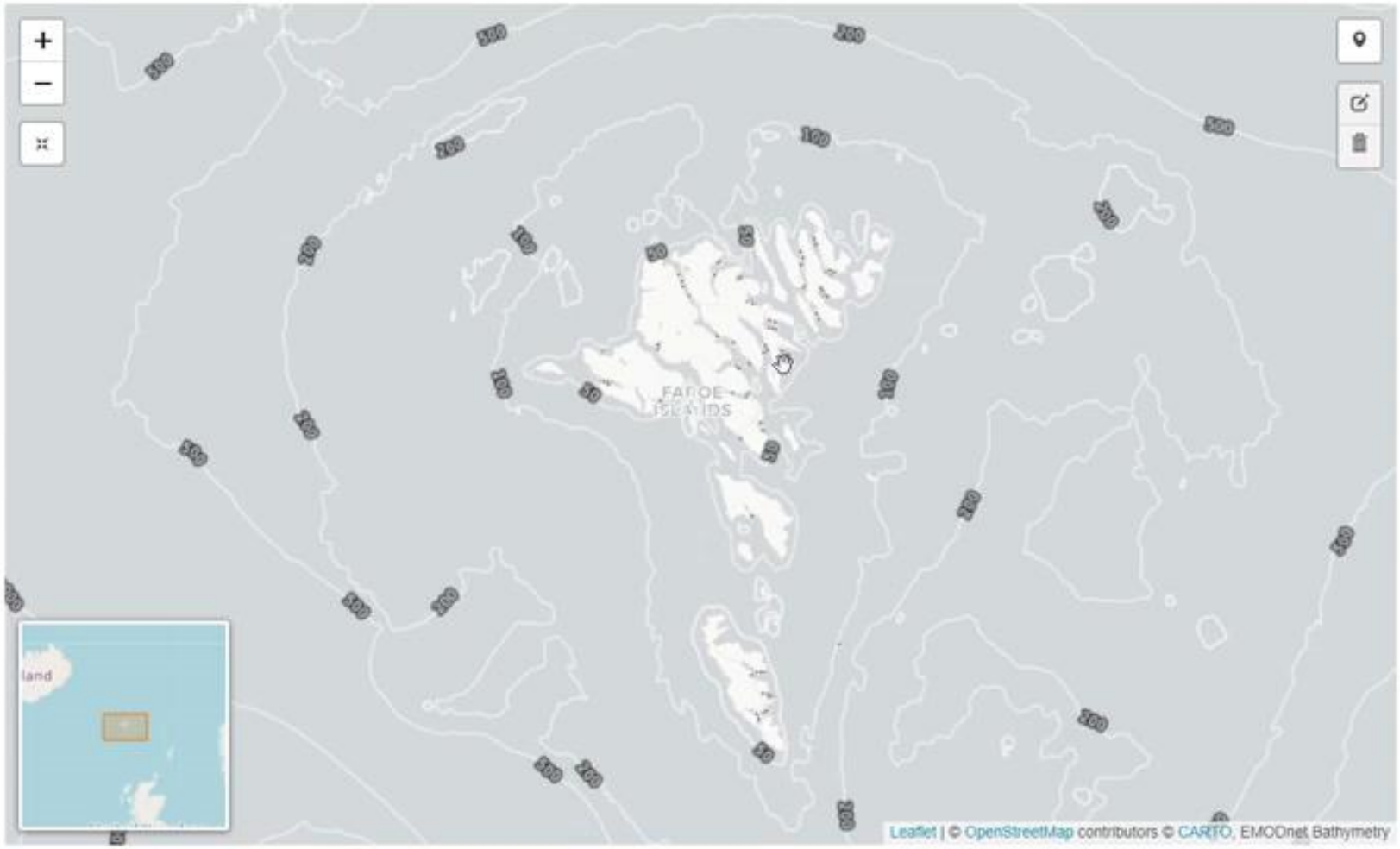
Model úrslit



App prototype

Accessibility

ADepoPlan



Sampling year:

1998 — 2023

1998 2001 2004 2007 2010 2013 2016 2019 2022

Model start and end:

2021-07-13 to 2021-07-15

Number of particles released:

1000

Particle release depth (single or range):

0 — 5 — 15

0 2 4 6 8 10 12 14 15

Cage Locations:

Download files:

Takk fyri meg ☺

Verkætlanin ADepoPlan er fíggjað av:

FIRUM
vitan til varandi aling

Vikmar

HIDDENFJORD
RAISED IN THE WILD

granskingarráðið
RESEARCH COUNCIL FAROE ISLANDS

umhvørvisstovan
environment agency

UMHVØRVISMÁLARÁÐIÐ
Ministry of Environment