Masteroppgåver ved Havforskingsinstituttet 2019–2020

Possible master theses at the Institute of Marine Research 2019–2020

NB! Det må etableres en kontakt med internveileder ved universitet så snart som mulig i de tilfeller det ikke allerede er angitt.
Contact must be established with an internal supervisor at the university as soon as possible in cases where it is not already stated.

FG Bunnfisk – Demersal fish

Kontaktperson: Erik Olsen (erik.olsen@hi.no)

Vi arbeider p.t. med tilrettelegging av flere masteroppgaver i Bergen. We are currently working with the facilitation of several master's theses in Bergen.

FG Fangst – Fish capture

Contact person: Svein Løkkeborg (svein.loekkeborg@hi.no)

Effekt av kunstig lys på atferd hos nordlig krill - The effect of artificial light on the behaviour of krill

Prosjekt passer som 60 STP master-oppgave for fiskeribiologer, marinbiologer og lektorstudenter. Prosjektet vil kreve at det legges opp et spesialpensum tilsvarende 5 STP omkring lys og havoptikk.

En hypotese er at krillen responderer ulikt på strålelys (som fra en lykt) og diffust lys (slik sollyset fortoner seg for krill på dypt vann). Den naturlige lyskomfortsonen omtalt ovenfor gjelder diffust lys og ikke strålelys (solen kan ikke sees som et bilde på de dybder krillen normalt befinner seg om dagen). Målet med denne oppgaven er å undersøke hypotesen over ved å utføre eksperimenter hvor krill utsettes for strålelys og diffust lys av tilsvarende lysstyrker. Det gir grunnlag for å se i hvilken grad krill har ulik fototaktisk respons i forhold til strålelys og diffust lys. Eksperimentene tenkes gjennomført i egnede laboratorier ved Matre havbruksstasjon.

One hypothesis is that krill respond differently on spotlight (directed light as from a flashlight) compared to diffuse light (like sunlight will appear at grate depths). The natural comfort zone, mentioned above, is related to natural light and not spotlight. The main aim of this thesis is to test the hypothesis above, by an experimental investigation, where krill is tested for their behaviour to spotlight and diffuse light of same intensity and wavelength composition. This will give an answer to whether krill respond differently to spotlight compared to diffuse light. The experiments will be performed at Matre havbruksstasjon (IMR), or any other relevant laboratory facility were krill are available in close reach.
***IMR-supervisors**: Anne Christine Utne Palm, anne.christine.utne.palm@hi.no , Odd-Børre Humborstad and Thor Klevjer*

Behaviour and welfare of herring and mackerel caught in purse seines. *The objective of this MSc project will be to describe and quantify the behaviour of pelagic fish (herring and mackerel) during their capture in purse seines and relate this to potential capture related stressors (e.g. hypoxia, crowding and net contact), to assess the potential impact upon the welfare of the catch. The candidate will use archived data and video from previous research cruises and will also have the opportunity to join a research cruise on a commercial purse seine vessel and collect further data.* ***IMR-supervisors****: Michael Breen, michael.breen@hi.no / Maria Tenningen, maria.tenningen@hi.no.*

Fiskestimenes reaksjon til fangst med ringnot og påvirkning på fangstsuksess
I prosjektet skal sonardata brukes til å undersøke hvordan makrell, sild og lodde reagerer til fangst med ringnot, hva som påvirker atferden og hvilken effekt det kan ha på fangstsuksess. Dataene er allerede innsamlede men det vil også være muligheter for å bli med på forskningstokt for å samle inn mer data.
Fish school reactions to capture by purse seine and implications on catch success
In this project sonar data will be used to describe the reactions of pelagic fish schools (mackerel, herring and capelin) to capture by purse seine, identify key drivers underlying the behavioural reactions and discuss effects on catch success. Data is available from previous research cruises and there will be an opportunity to join a cruise on board a commercial fishing vessel for further data collection.
IMR-supervisor*: Maria Tenningen, maria.tenningen@hi.no.*

FG Fiskeernæring – Research program Fish Nutrition

Contact person: Rune Waagbø (Rune.Waagbo@hi.no)

In principle, all our running research projects in the research program can be available for master student studies.

Investigating the requirements for micronutrients in Lump sucker (*Cyclopterus lumpus*). *IMR-supervisor: Øystein Sæle* (oystein.saele@hi.no)

Investigating the requirements for micronutrients in Ballan wrasse (*Labrus berggylta*). IMR-*supervisor: Øystein Sæle* (oystein.saele@hi.no)

Applying a gut sac model (from salmon) to investigate the impact of undesirables in feed, such as pesticides, on intestinal integrity. *IMR-supervisor: Øystein Sæle* (oystein.saele@hi.no)

Effects of n-3/n-6 profile on AGD development (OptiHealth project). *Altantic salmon smolts fed one of 4 combinations of n-3/n-6 ration diets are challenged with Neoparamoeba perurans and examined for progression of AGD, blood clinical markers and gill inflammatory marker expression (qPCR).* ***IMR-supervisors****: Prof. Mark Powell (mark.powell@hi.no) and Nini Sissener* (nini.sissener@hi.no).

Effects of fatty acid/amino acid profile on Atlantic salmon responses to SAV infection (OptiNutr project). *Atlantic salmon fed on different fatty acid/amino acid diets are bath challenged with SAV, and the progressive development of PD in fish fed different diet regimes are followed in samples of heart, pyloric caecae (pancreas) and other tissues by histology and qPCR.* ***IMR-supervisors****: Prof. Mark Powell and Nini Sissener* (nini.sissener@hi.no).

Kan fiskemelke eller fiskemelke-komponenter modulere immunresponsen hos atlantisk laks (*Salmo salar*)? En cellestudie. *Fiskemelke er en betydelig ressurs som kan ha stor innvirkning på fiskens helse og velferd som en funksjonell fôringrediens ved stressende hendelser som håndtering, vaksinering, når den er smittet med virus og bakterier, når fisken blir utsatt for miljøgifter eller en kombinasjon av disse stressfaktorene.*
HI-veiledere*: Elisabeth Holen* (elisabeth.holen@hi.no) *og Marit Espe (marit.espe@hi.no).*

FG Fiskeridynamikk – Fisheries dynamics

Contact person: Jon Helge Vølstad (jon.helge.voelstad@hi.no)

Robustness-analysis of fishery dependent estimates. *The IMR run several sampling programs to collect data from commercial fisheries. An in-depth analysis on how robust estimates are to variations in sampling intensity from different gears, at different times and in different places, will provide important validation of estimates and has great potential to assist efforts in developing future sampling programs.*
IMR-supervisor*: Edvin Fuglebakk (edvin.fuglebakk@hi.no).*

Cath per unit effort indices. *Data sources contain information on total catch and fishing effort from commercial vessels, as well as meta-information about time, location and fishing-gear. The candidate will apply existing theory to analyse Norwegian fisheries-data.*
IMR-supervisor*: Edvin Fuglebakk (edvin.fuglebakk@hi.no).*

Time series analysis of survey estimates. *The survey estimates are traditionally used as input to assessment models, but there could be simpler models serving as alternatives to the assessment models, which are worth pursuing.*
Suggested contact*: Jon Helge Vølstad* (jon.helge.voelstad@hi.no)

FG Marin økosystemakustikk – Ecosystem acoustics

Contact person: Rolf Korneliussen (rolf.korneliussen@hi.no)

Bootstrapping of acoustic-trawl surveys. *Variance estimation of acoustic-trawl and swept-area survey estimates has received increasing attention with the on-going REDUS project (Reduced Uncertainty in Stock Assessment) at the IMR. Using the StoX software, the variance of the survey estimates can be estimated by bootstrapping echosounder and trawl data. This routine has however not been intensively tested with regards to number of bootstrap replicates, number of data points available and the stochastic nature of the data. Evaluating these bootstrap routines and suggesting alternatives would be a valuable contribution to the assessment of fish stocks.* ***Suggested contact****: Espen Johnsen* (espen.johnsen@hi.no).

Image analysis of echosounder and sonar data. *Machine learning initiatives have been initiated at the IMR for categorizing images of fish, seals and other organisms, and similar approaches are intended for acoustic data. Alternatively, traditional image analysis can be applied.* ***Suggested contact****: Nils Olav Handegard* (nilsolav@hi.no).

FG Oseanografi og klima – Oceanography and climate

Contact person: Jan Erik Stiansen (jan.erik.stiansen@hi.no)

Optimal plassering av oppdrettsanlegg basert på kunnskap om strøm og smittespredning. *Kandidaten vil fortrinnsvis benytte numeriske simuleringsmodeller for strøm og partikkelspredning til å gjennomføre scenarie-testing av ulik plassering av oppdrettsanlegg. Det vil også være muligheter for å delta på tokt og gjennomføre innsamling av hydrografi og strømdata fra felt.* ***HI-veileder****: Lars Asplin (lars.asplin@hi.no).*

Fornying av bassengvann i terskelfjorder i dag og i et framtidig klima. *Kandidaten vil gjennom å analysere resultater fra numeriske strømmodeller identifisere bassengvann-utskiftning og hvilke prosesser som fører til dette. Med strømmodellsystemet vil kandidaten manipulere ferskvannsavrenningen og teste i hvilken grad økt nedbør og ferskvanns-avrenning til fjordene vil påvirke utskiftningen av bassengvann.* ***HI-veileder****: Lars Asplin (lars.asplin@hi.no).*

Masteroppgave om strøm over terskel i Hardangerfjorden. *Havforskningsinstituttet har observasjoner som viser vertikal profil av strøm, temperatur og salt.* ***Kontaktperson****: Jan Erik Stiansen (jan.erik.stiansen@hi.no)*

FG Pelagisk fisk – Pelagic fish

Contact person: Aril Slotte (aril.slotte@hi.no)

Capelin stock-dynamics. *This can be explained by over-harvesting and predator-relation-ships, but some indicators also suggest effects related to intraspecific effects, that is effects on growth and spawning caused by the competition for food within the capelin stock. The candidate will develop mathematical models to explore hypothesis of how different con-straints on growth and spawning dictate stock dynamics.* ***IMR-supervisors****: Edvin Fuglebakk (edvin.fuglebakk@hi.no), Sam Subbey (sam.subbey@hi.no), Georg Skaret (georg.skaret@hi.no).*

FG Sjøpattedyr – Marine mammals

Contact person: Tore Haug (tore.haug@hi.no)

Analyser av allerede innsamlede data av hvalarter. *Kontaktperson: Nils Øien (nils.oien@hi.no).*

FG Økosystemprosesser – Ecosystem processes

Contact person: Mette Mauritzen (mette.mauritzen@hi.no).

Diettanalyser 0-gruppe torsk gjennom kritisk fase Skagerrak. *Innsamlet materiale, men studenten kan bli med på tokt. To oppgaver.* ***HI-veileder:*** *Tore Johannessen (tore.johannessen@hi.no).*

Endringer i bentos-biomasse i tid og rom; transekter – koble til miljøvariabel. *Innsamlet materiale, men studenten kan bli med på tokt.* ***HI-veileder:*** *Lis Lindal Jørgensen (lislin@hi.no).*

Hvordan varierer bredden i fiskediett – mellom individer/innen individer, lokalt og regionalt? *Innsamlet materiale, men studenten kan bli med på tokt.* ***HI-veileder****: Per Arneberg (per.arneberg@hi.no).*

Eksperimentelt oppsett for å teste konkurranse mellom stillehavøsters fucus-arter ift. kolonisering av hardbunn. *HI-veileder: Anders Jelmert (anders.jelmert@hi.no).*

Økosystembasert høsting av rekefjorder i Finnmark inkl. modelleringsverktøyet ECOPATH. *I dette prosjektet kan det bli aktuelt med masterstudenter i flere arbeidspakker.* ***HI-veiledere****: Guldborg Søvik, guldborg.soevik@hi.no, Kjell Nedreaas, kjelln@hi.no og Lis Lindal Jørgensen (lislin@hi.no).*

FG Reproduksjon og utviklingsbiologi – Reproduction and developmental biology

Kontaktperson: FG-leder Anna Troedsson Wargelius (annaw@hi.no).

I satsningsområdet **Bærekraftig oppdrett av marin fisk** kan vi tilby oppgaver innen reproduksjon og tidlige livsstadier på kveite og andre marine fiskearter som kan være aktuelle som kandidater for oppdrett. *Within the focus area «Sustainable aquaculture of marine fish», we have MSc thesis projects on reproductive physiology and early development of Atlantic halibut and other species that may be candidates for aquaculture.*
HI-veileder*: Birgitta Norberg (birgittan@hi.no):*

Influence of light on signaling pathways and metamorphosis behaviour of halibut (*Hippoglossus hippoglossus*). *The aim of this MSc project is to understand the signaling pathways that will lead to flatfish swimming behaviour prior eye migration and pigmentation formation under influence of light. The student will use imaging and video analyses for recording fish behaviour and morphological defects (eye and pigmentation) under light regime. He/she will also examine molecular markers involved in eye migration modulation.*
Contact: Torstein Harboe (torsteinh@hi.no); Prescilla Perrichon (prescilla perrichon@hi.no); Birgitta Norberg (birgittan@hi.no)

The role of multiple vitellogenins and cathepsins in acquisition of egg buoyancy in Atlantic halibut (*Hippoglossus hippoglossus*)

Atlantic halibut oocytes undergo extraordinary hydration during maturation, and halibut eggs exhibit highly variable buoyancy. Egg buoyancy is an important parameter representing egg quality in most marine fishes. The objective of this MSc project is to 1) investigate the involvement of multiple vitellogenins (Vtgs) and the functionality of certain cathepsins (CTS) in the process of maturational yolk proteolysis and oocyte hydration in the Atlantic halibut, and 2) relate them to egg quality. The candidate will utilize molecular, biochemical and immunochemical tools for detection of multiple Vtgs in prehydrated and mature oocytes leading to eggs of different buoyancy grades.
Contact: Birgitta Norberg (birgittan@hi.no); Özlem Yilmaz (ozlem.yilmaz@hi.no)

FG Plankton

Kontaktperson: FG-leder Kjell Gundersen (kjell.gundersen@hi.no)

*Two Master's projects will study **the feeding ecology of myctophids in the Northeast Atlantic Ocean**. Samples have been collected during the "Mesopelagisk Irmingerhavet" cruise 2018 by the IMR. These projects will investigate and compare the diet change along the longitudinal gradient and fish size. Resource partitioning, diet overlap and prey selectiveness will also be investigated. One project will study the stomach contents of smaller myctophid species (Benthosema glaciale, Myctophum punctatum and Protomyctophum arcticum) and a second project will study the stomach contents of larger myctophid species (Lampadena speculigera, Lampanyctus sp. and Notoscopelus kroeyeri). Laboratory work is a component for both projects. We are searching two motivated students that can work together on similar topics. Participation in a cruise to learn how sampling mesopelagic fish is optional. Both projects will require collaborating with the IMR. The projects are open to Master students in Marine biology, Biodiversity, Evolution and ecology, and Fisheries biology and management. **IMR-supervisor**: Eva García Seoane (eva.garcia.seoane@hi.no).*

Trophic position of myctophids in the Northeast Atlantic.
In this Master project, we will conduct stable isotope analysis ($\delta_{15}N$ and $\delta_{13}C$) on myctophid, but also in their potential prey and competitors. This project cover specimens collected in the Northeast Atlantic. The trophic relationship between the myctophid species will be study, and also their position in the trophic web. Laboratory work is required and participation in a mesopelagic cruise will be optional. The master student will be a member of the Theoretical Ecology Group http://bio.uib.no/te/ and also collaborate with researchers in the Institute of Marine Research***. IMR-supervisor:*** *Eva García Seoane (eva.garcia.seoane@hi.no).*

See also https://www.hi.no/hi/forskning/student-som-vil-bli-havforsker