

12. MEĐUNARODNI GOSPODARSKO-ZNANSTVENI SKUP O AKVAKULTURI

24.-25. studenoga 2016., Hotel Lav Vukovar

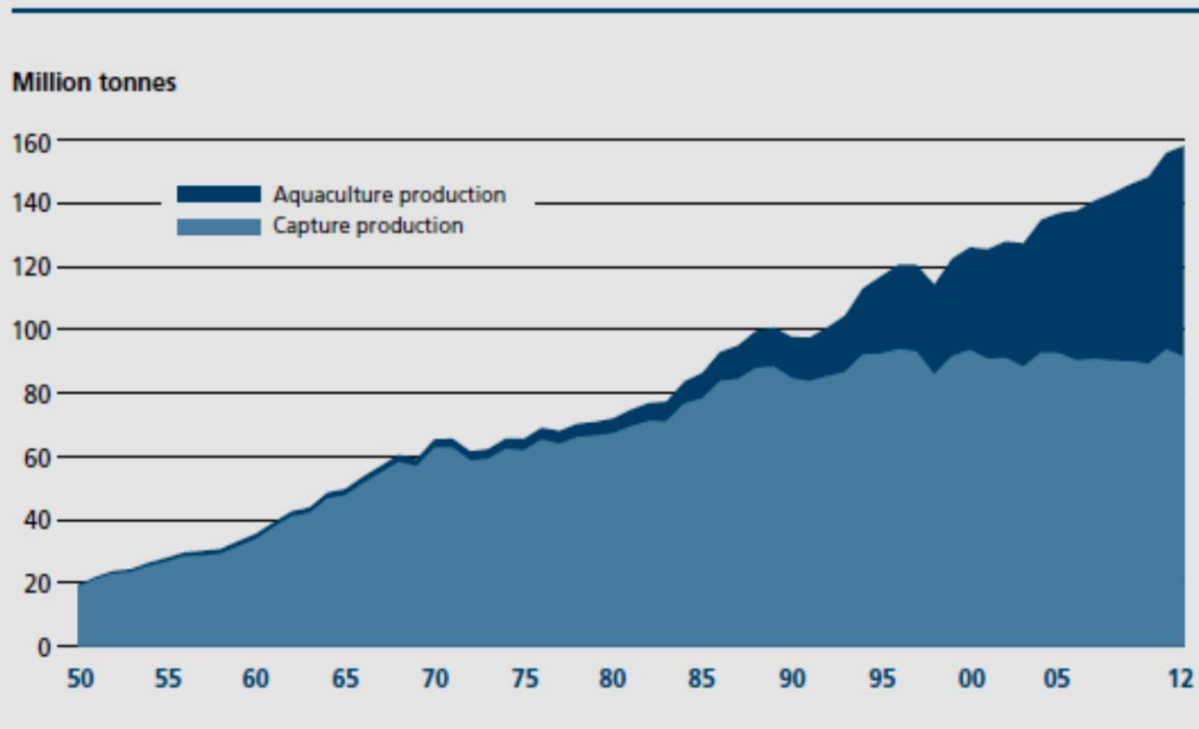
Cage aquaculture - impact of accidental fish escape on environment



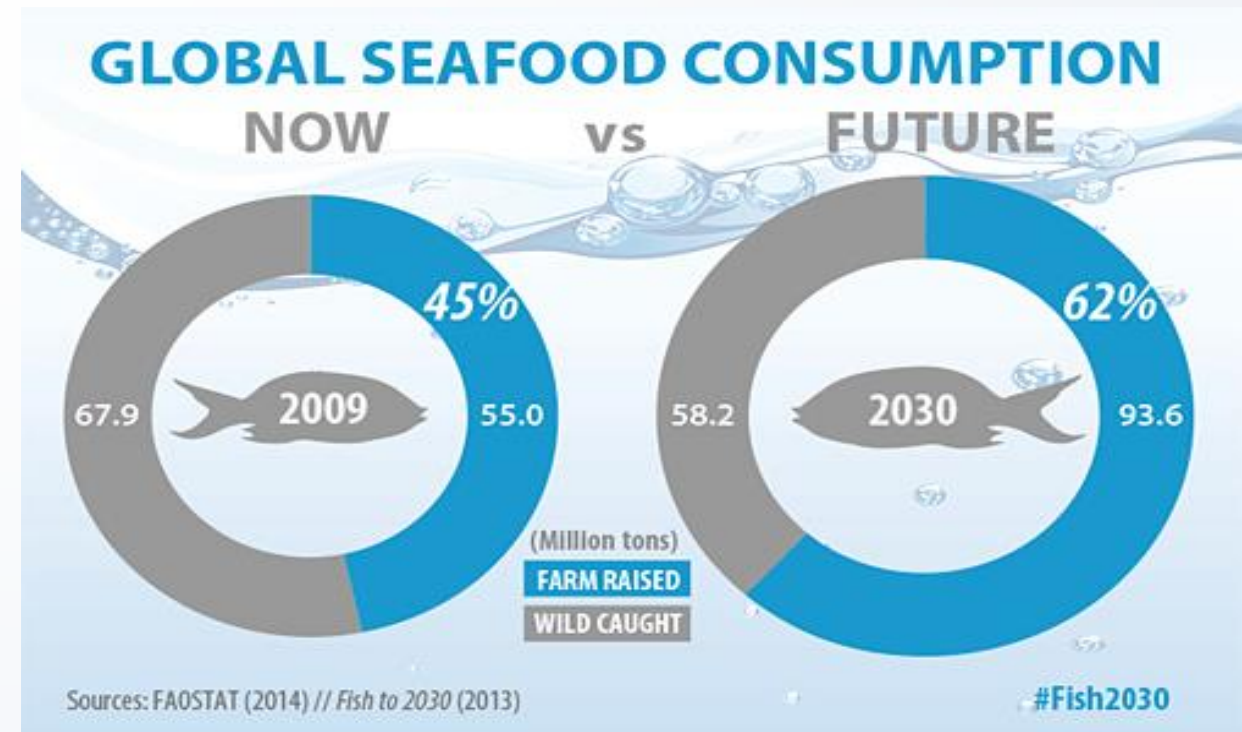
PhD TANJA ŠEGVIĆ BUBIĆ



TRENDS IN AQUACULTURE PRODUCTION

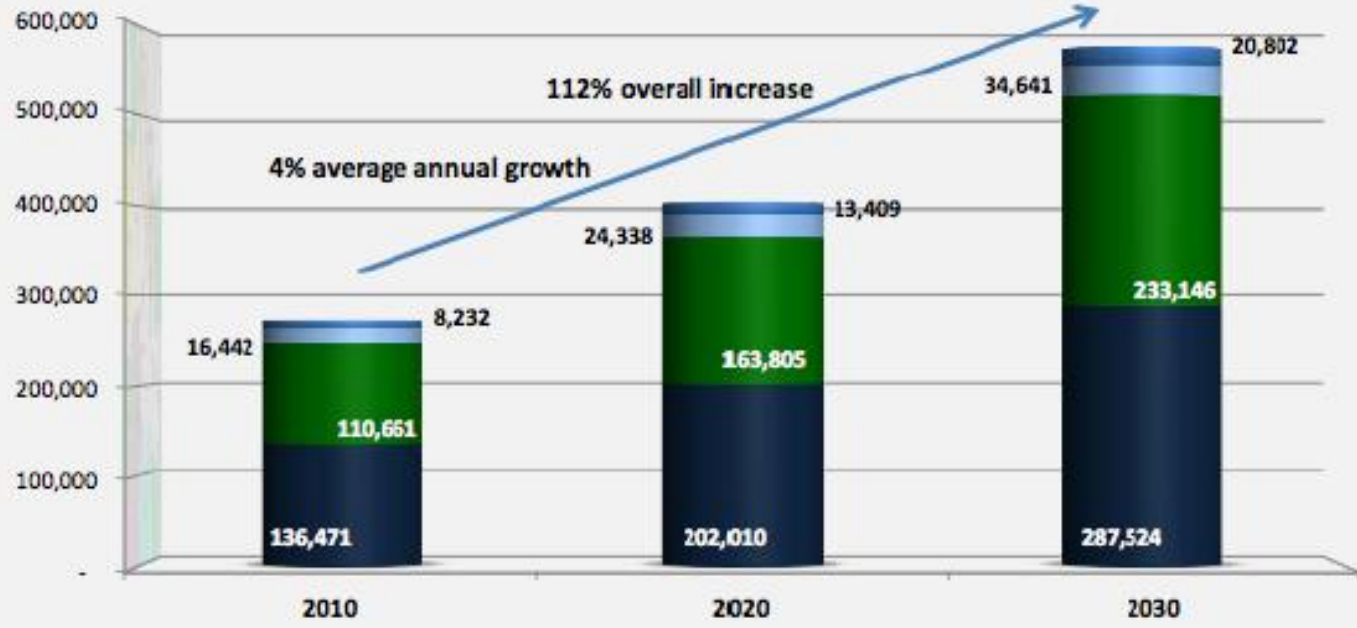


The review of the global fish capture and the aquaculture production (FAO, 2014)



The estimate of the global consumption of fish: from capture and aquulture by the year 2030.

■ Seabream ■ Seabass ■ Other ■ Flatfish



Dicentrarchus labrax



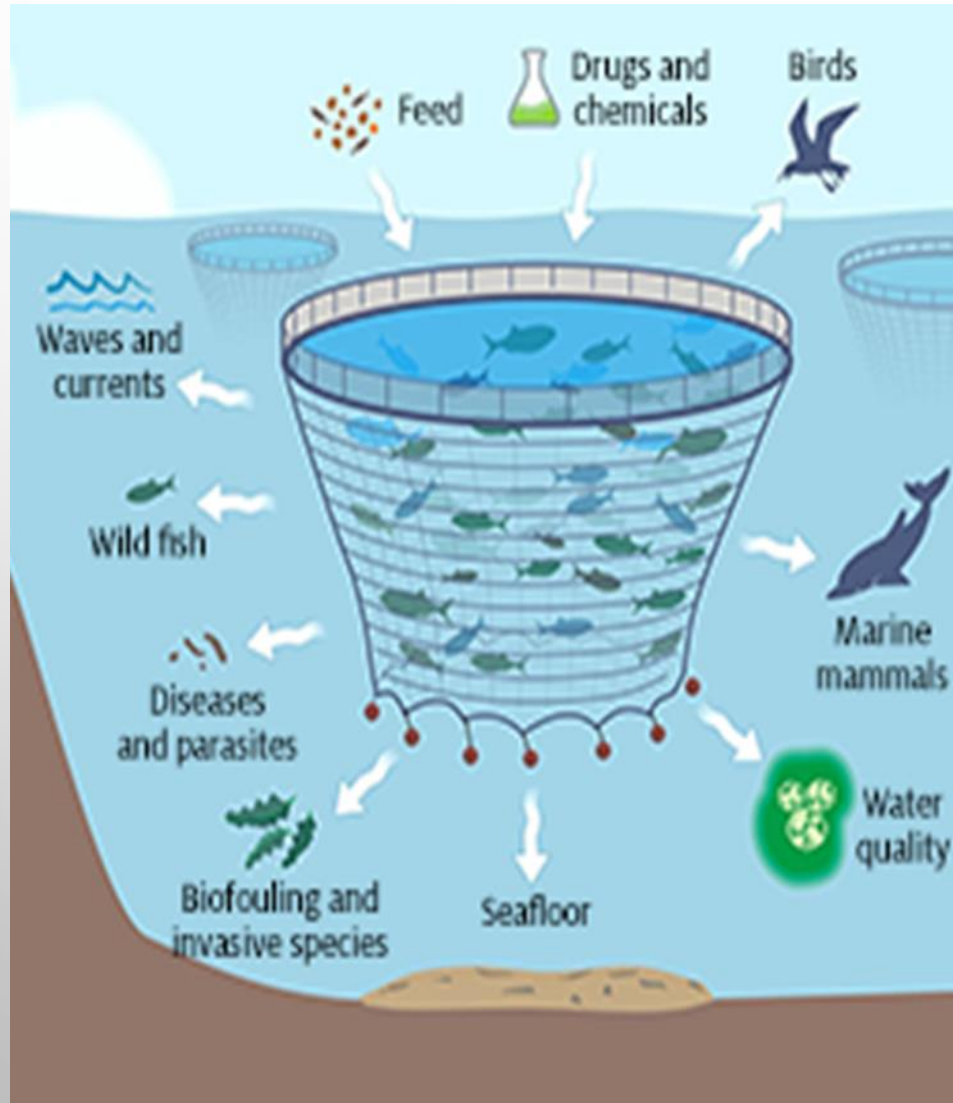
Sparus aurata

Trends in Mediterranean aquaculture

Locations for mariculture in the Mediterranean (Source: Trujillo et al. 2012)



AQUACULTURE IMPACT ON ENVIRONMENT



- **LOSS OF NATURAL HABITAT**

- **POLLUTION**

- EUTROPHICATION
- DISEASE AND PATHOGENS
- ANTIBIOTICS, STEROIDS, DRUG RESISTANT PATHOGENS

- **LOSS OF GENETIC DIVERSITY**

- BROOD STOCK

- **ESCAPEES**

- COMPETITION FOR FOOD AND HABITAT
- GENETIC POLLUTION

- **PREDATOR CONTROL**

- PERMITTED AND UNPERMITTED CONTROL OF BIRDS, MARINE MAMMALS, ETC.

COMPETITION FOR FOOD AND HABITAT

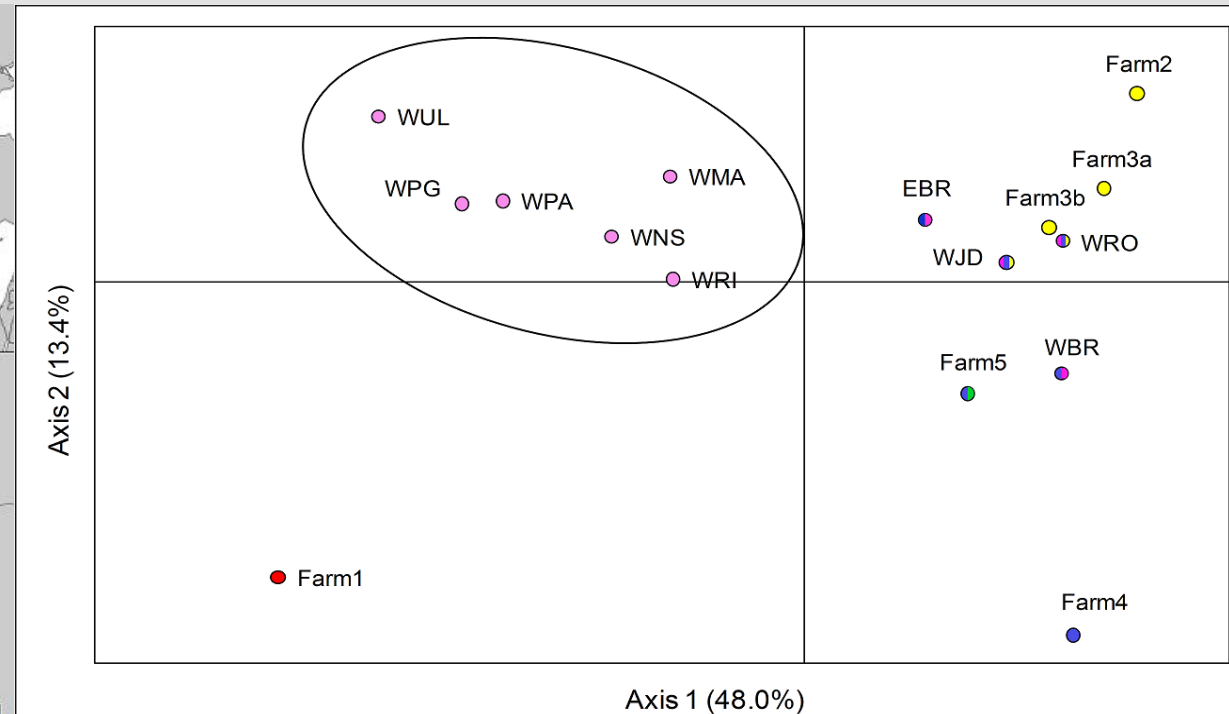
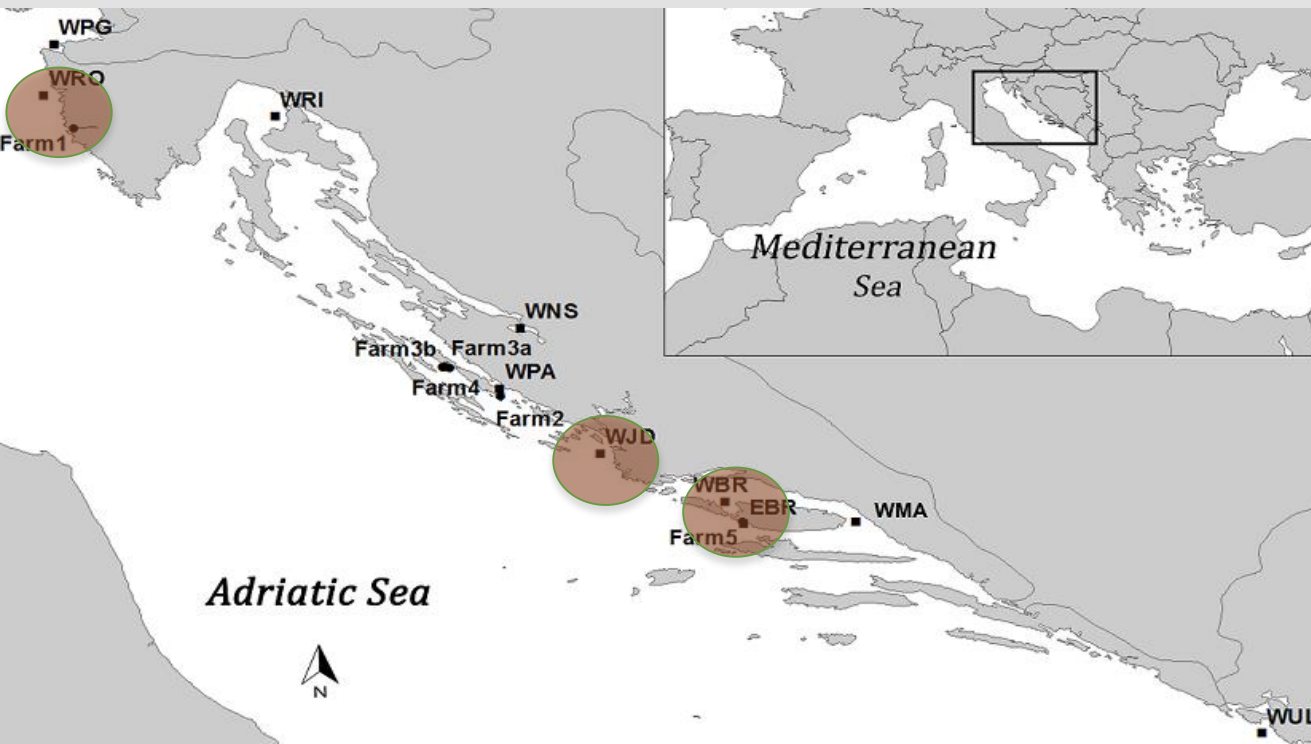


GENETIC INTERACTIONS BETWEEN ESCAPED FARMED AND WILD FISH

- Application of molecular markers – microsatellites
- Case study – *Sparus aurata*, *Dicentrarchus labrax*

Šegvić-Bubić et al. (2011) **Population genetic structure of the reared and wild gilthead sea bream (*Sparus aurata*) in the Adriatic inferred with microsatellite loci.** *Aquaculture*. **318**; 309-315.

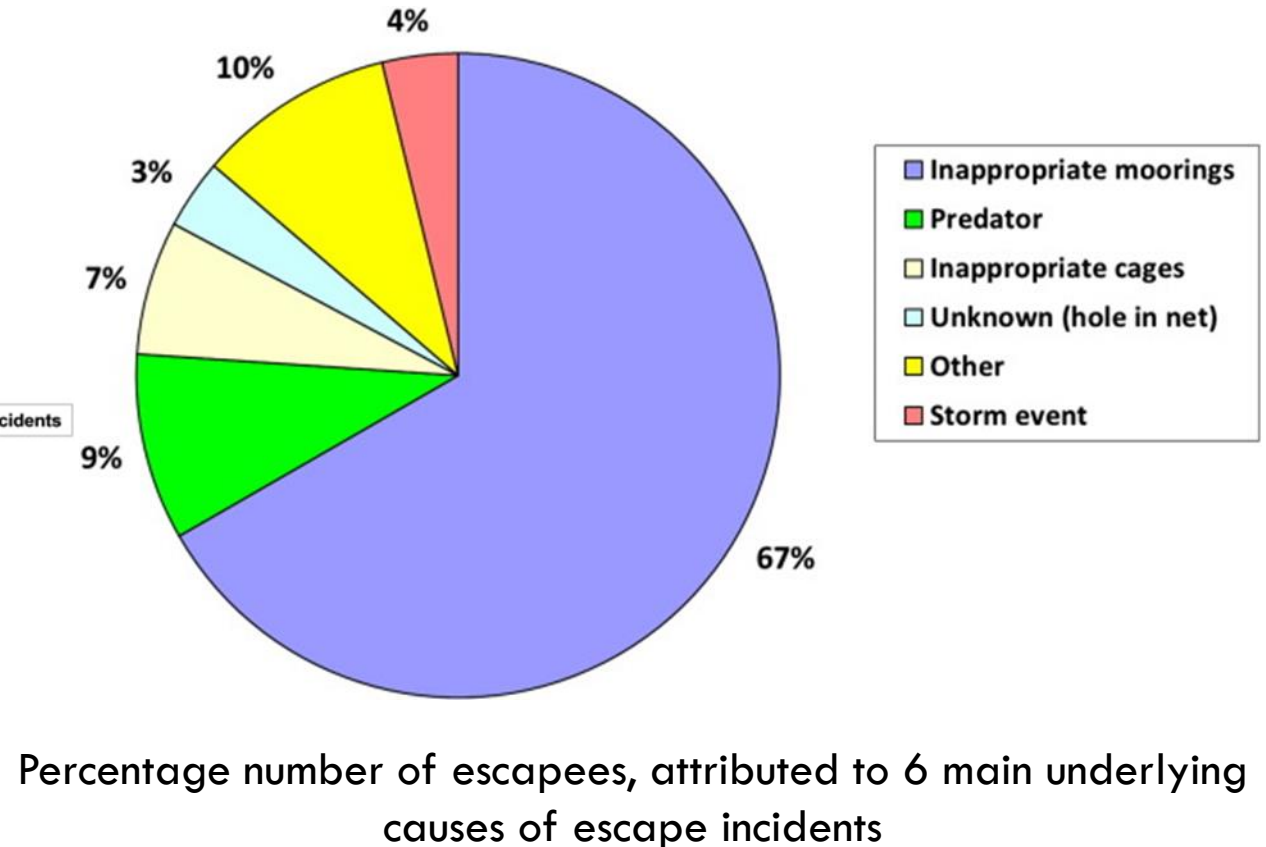
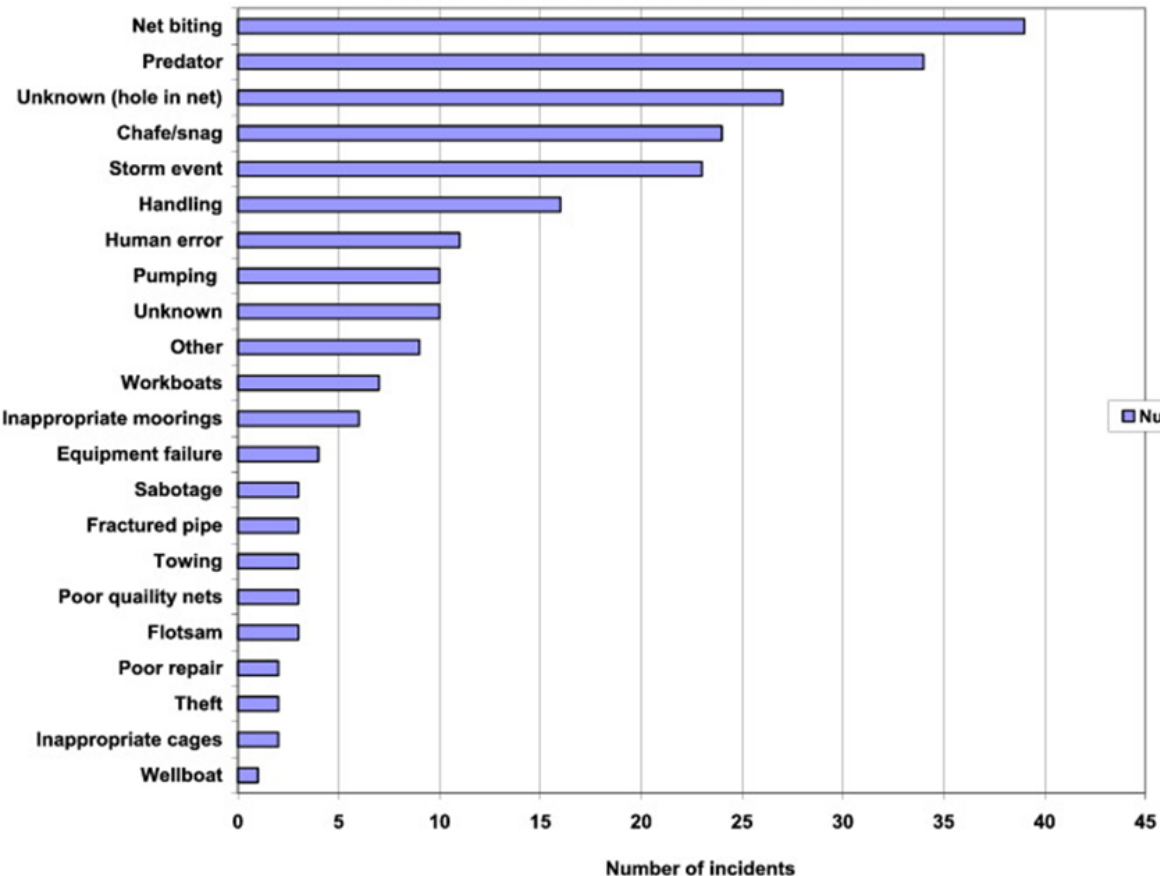
Šegvić-Bubić et al. (2016) **Genetic characterization of wild and farmed European seabass in the Adriatic Sea: assessment of farmed escapees using a Bayesian approach.** *ICES Journal of Marine Science*. In press.



Underlying causes of escapes

- Six European countries over three years - nearly 9 million fish escaped from sea cages
 - Jackson et al. A pan-European valuation of the extent, causes and cost of escape events from sea cage fish farming. *Aquaculture*, Volume 436, 2015, 21–26.

Underlying causes of escapes versus number of incidents



Percentage number of escapees, attributed to 6 main underlying causes of escape incidents



• Escapees in close vicinity of fish farms



Application of passive acoustic telemetry to monitor escapees behavior

- dispersion capacity in time and space
- escape incident simulation of seabream tagged with acoustic transmitters
- 4 months monitoring (n=25)









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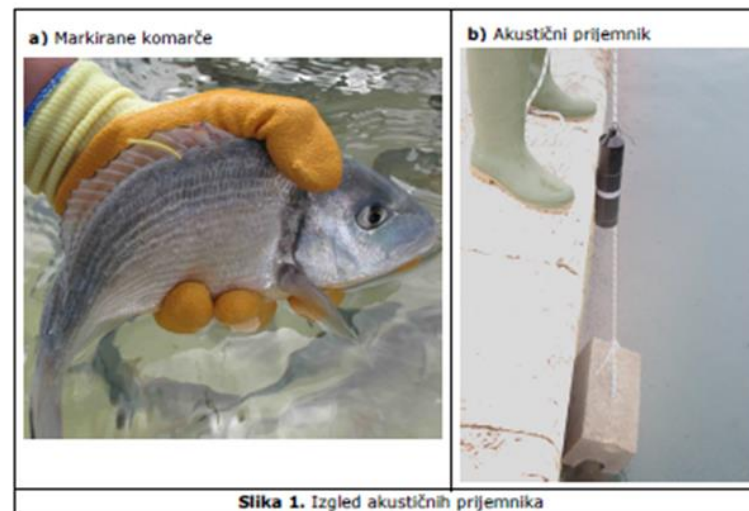
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OBAVIJEST

Poštovani,
Ovim putem bih Vas htjeli obavijestiti da **Institut za oceanografiju i ribarstvo**, u sklopu projekta financiranog od strane Hrvatskog saveza za športski ribolov na moru (HSSRM), provodi telemetrijska istraživanja u širem području uvale Zečevo.

Akustični prijemnici (vidi Sliku 1b) su postavljeni na više lokacija u **širem području uvale Zečevo**, par metara od samog dna. Prijemnici bilježe kretnje 20-ak komarči koje su markirane akustičnim senzorom od strane djelatnika Instituta.

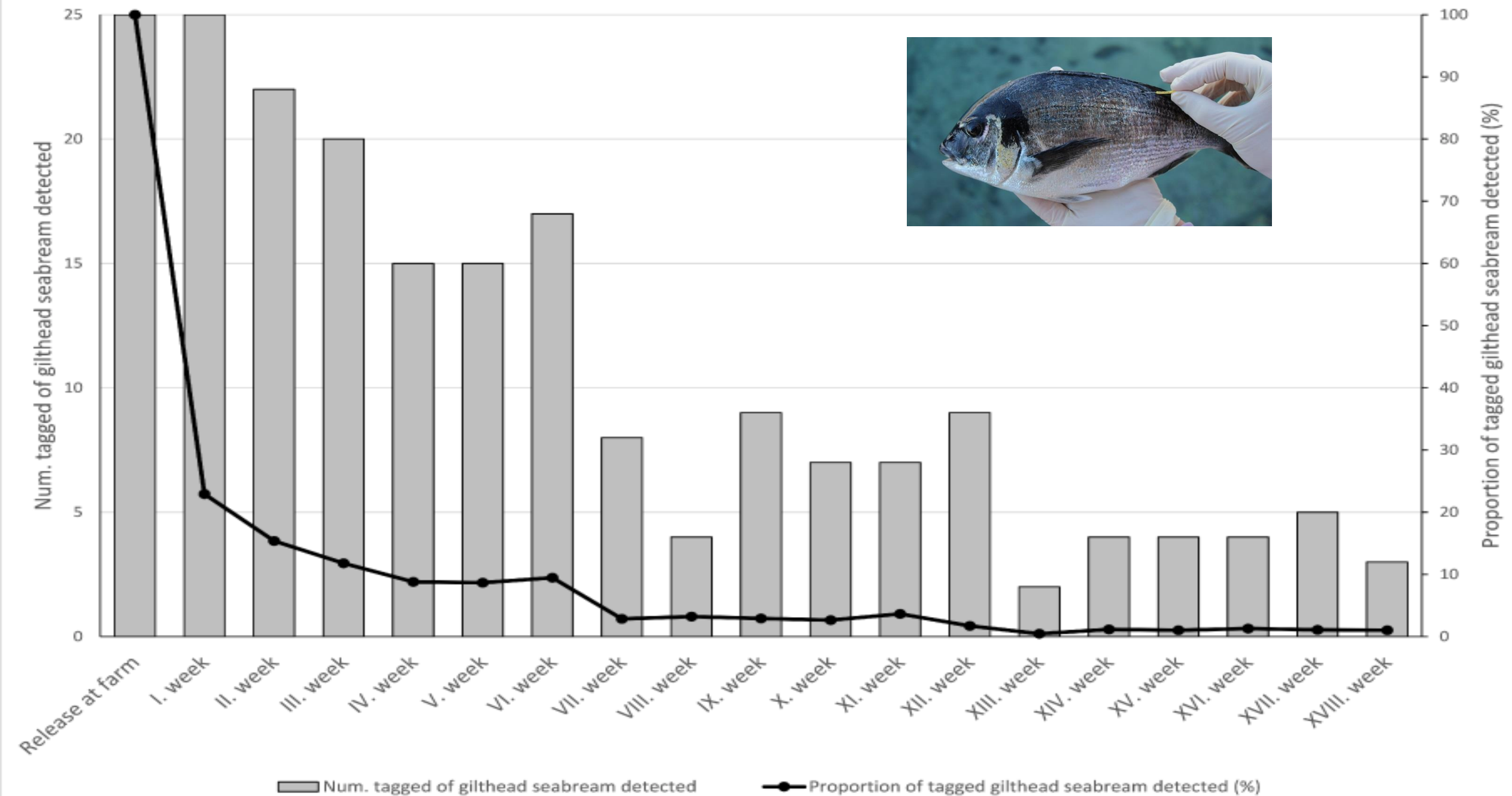
Ovim putem Vas molimo da prijemnike ne dirate dok su u moru, a u slučaju da ih nađete ili ako uhvatite komarču markiranu od strane djelatnika Instituta (Slika 1a), molimo Vas da nas obavijestite na dolje navedeni kontakt.



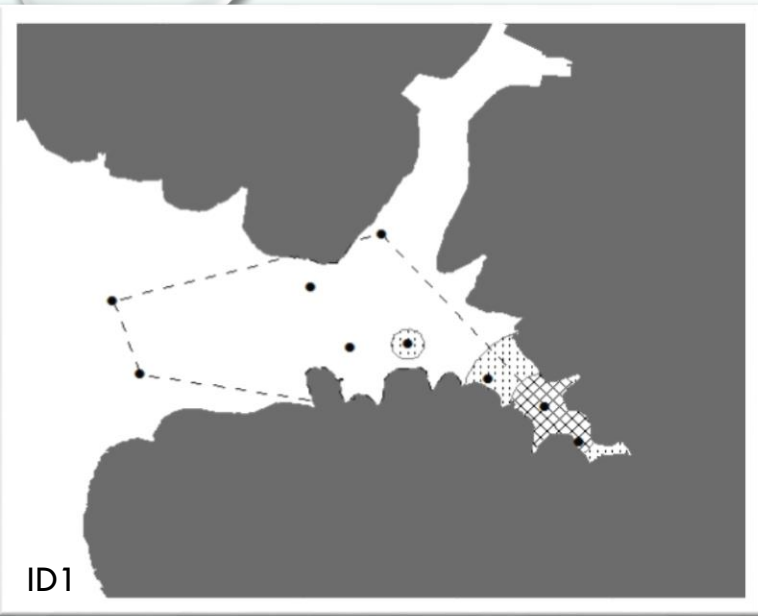
Kontakt: Tanja Šegvić Bubić, tseqvic@izor.hr, tel. 0959022955

The tagged fish in the 24-hour observation (above) and release the fish close to the commercial cage (below)

Results – fish residency



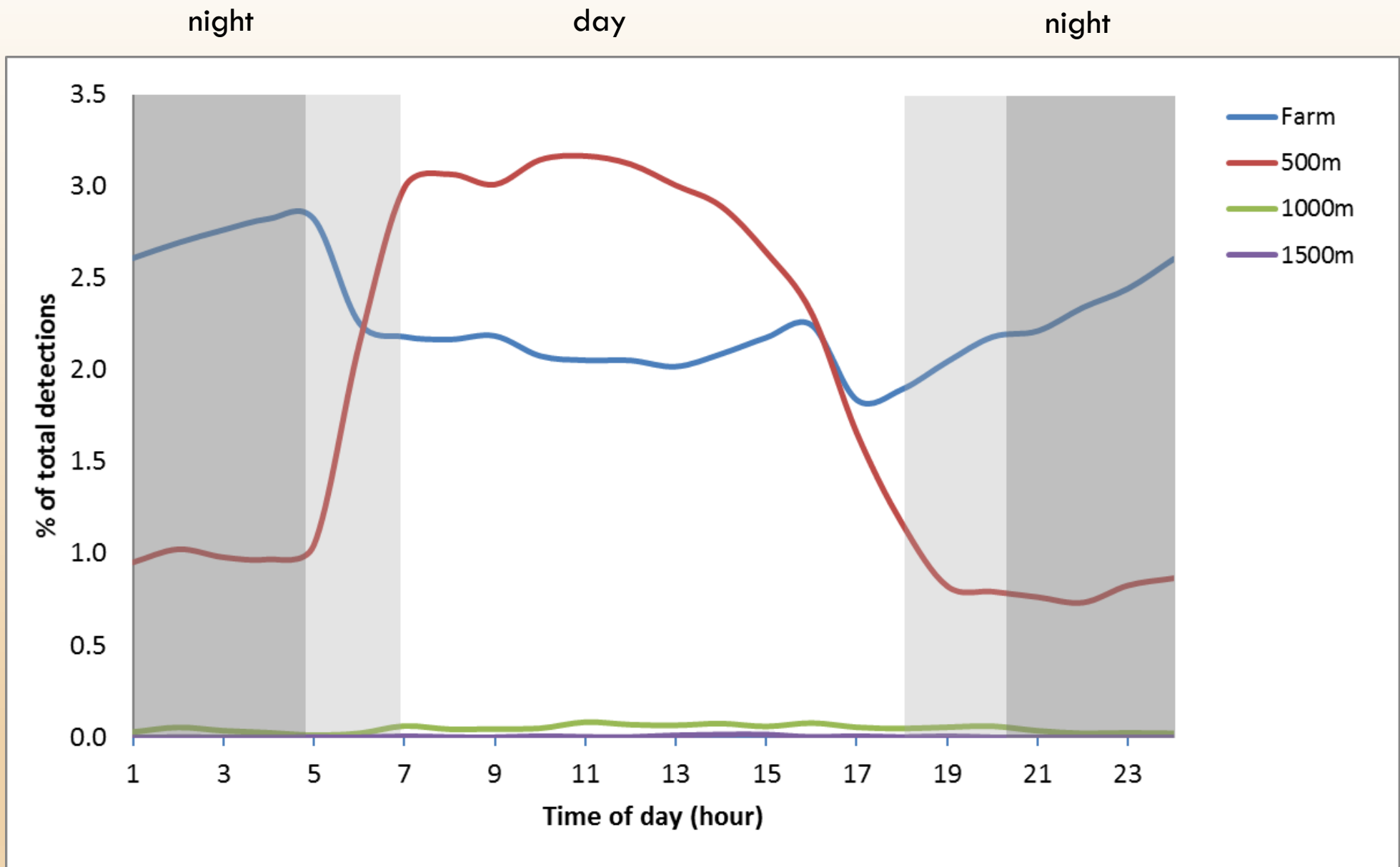
Habitat use – core activity (50% KUD) and home range area (95% KUD)



Home range and core activity areas for ***Sparus aurata*** tagged with acoustic transmitters.

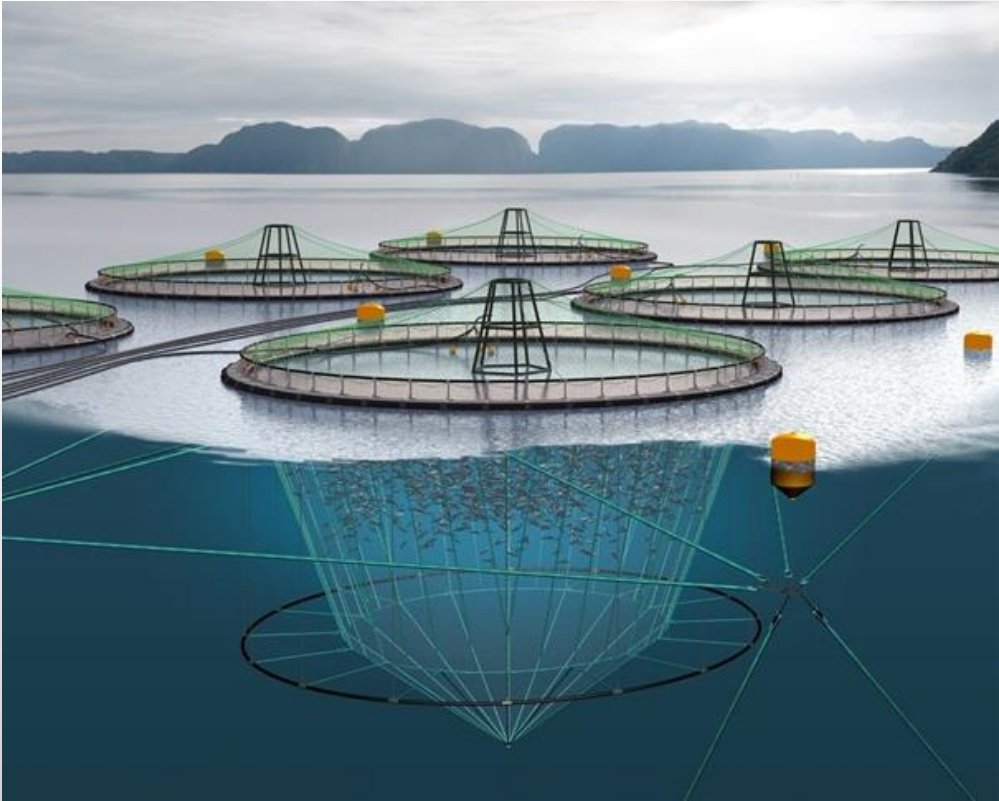
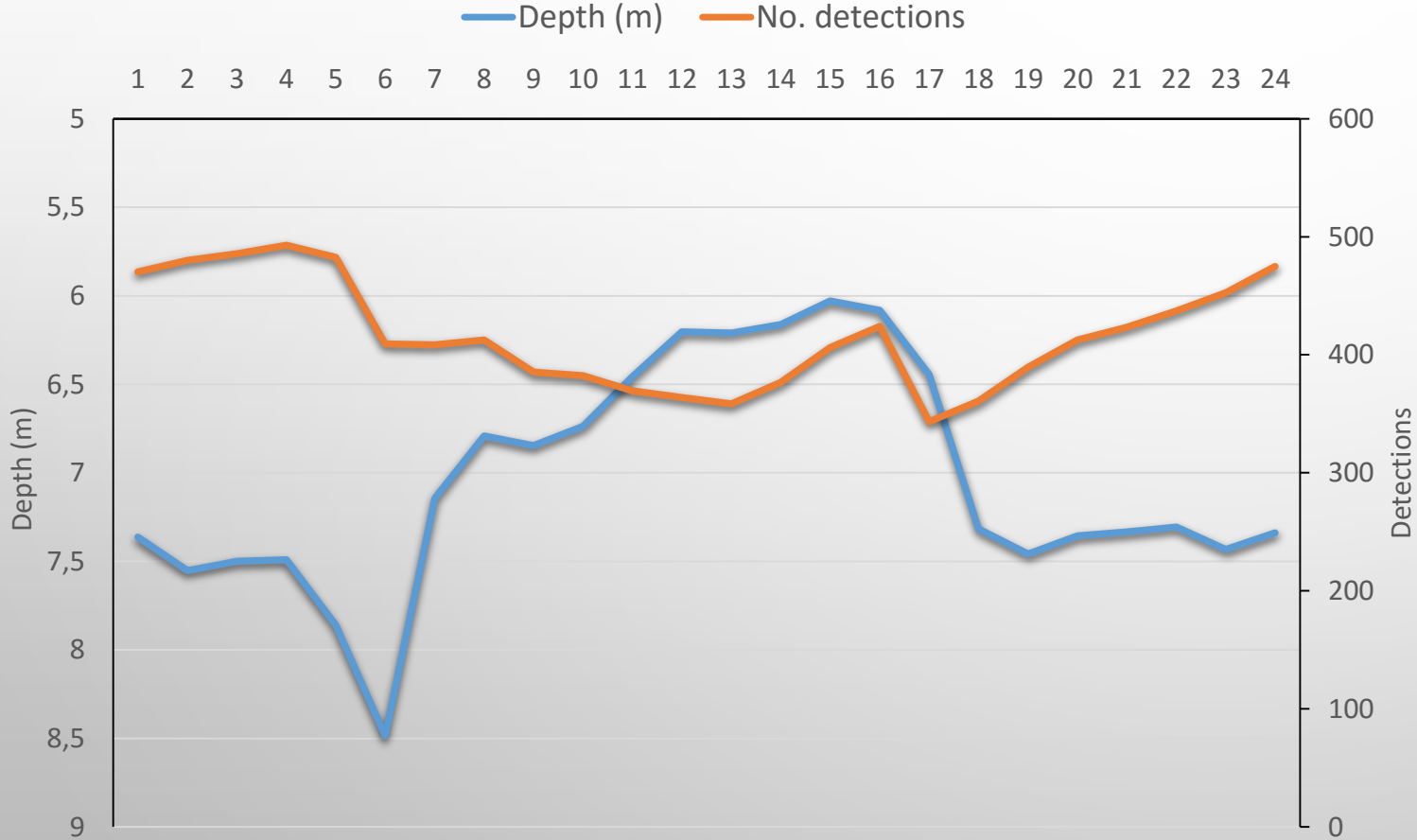
Minimum Convex Polygon (MCP) (dashed line), 50% Kernel utilization distribution (KUD) (grid area) and 95% KUD (dotted area)





Habitat use by time of day in regard to the detection's observed around farm, 500m distance from farm, 1500m distance from farm

Repeated measures ANOVA – vertical distribution of tagged fish within farm



OBSERVATIONS AND CONCLUSIONS:

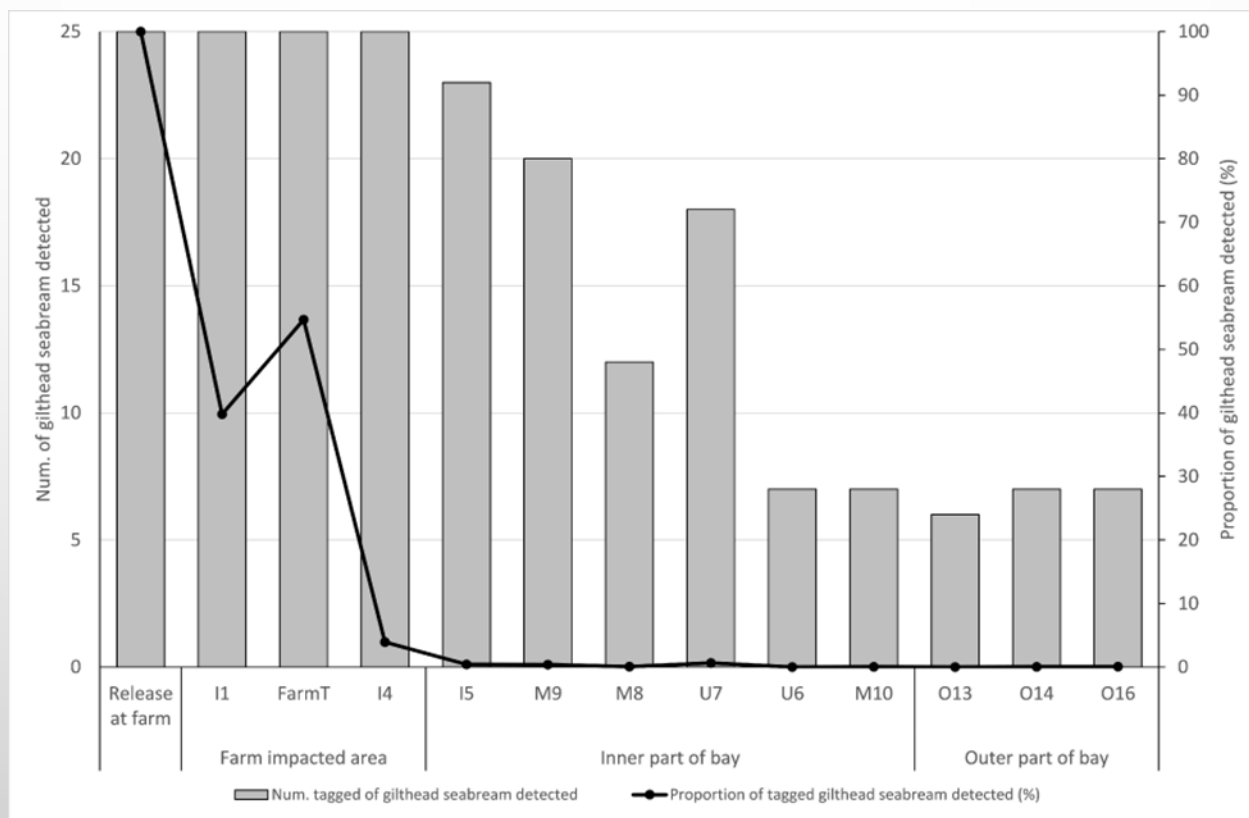
- a) considerable ability of escapees to survive in the natural environment
- b) initial attachment to the parent farm that can be characterized as a period of adaptation to new environmental conditions
- c) significant vulnerability to coastal fishing activities
- d) recapture of escaped fish from cages is possible and it should be realizable within 2-3 weeks of the incident
- e) responsible management (improved escapees prevention measures and recovery plan for escaped fish which are usually foreign origin) will certainly slow the loss of the original genetic structure of the Adriatic sea bream





THANK YOU!

QUESTIONS....



The image features a light gray background with several realistic water droplets of various sizes scattered in the corners. The droplets have highlights and shadows, giving them a three-dimensional appearance. They are located in the top-left, top-right, and bottom-right areas of the frame.

<http://articles.mercola.com/sites/articles/archive/2016/04/30/salmon-fish-farming.aspx>