



What are marine mammals?	Why important to study?	How to study them?	Field trip tomorrow	Data processing
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Marine Mammals Monitoring in the framework of EcAp Common Indicators

Ibrahim Ben Amer



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- Different mammal species living in the sea
- orders: Cetacea, Carnivora and Sirenia.
- 70± species of cetaceans and 30± of seals worldwide.
- In the Mediterranean, there are 8 (regular). species of cetaceans and 1 species of seals.



Fin whale (*Balaenoptera physalus*)

VU



Sperm whale (*Physeter macrocephalus*)

VU



Cuvier's beaked whale (*Ziphius cavirostris*)

VU



Long finned pilot whale (*Globicephala melas*)

VU



Risso's dolphin (*Grampus griseus*)

VU



Bottlenose dolphin (*Tursiops truncatus*)

VU



Striped dolphin (*Stenella coeruleoalba*)

VU



Short-beaked common dolphin (*Delphinus delphis*)

EN



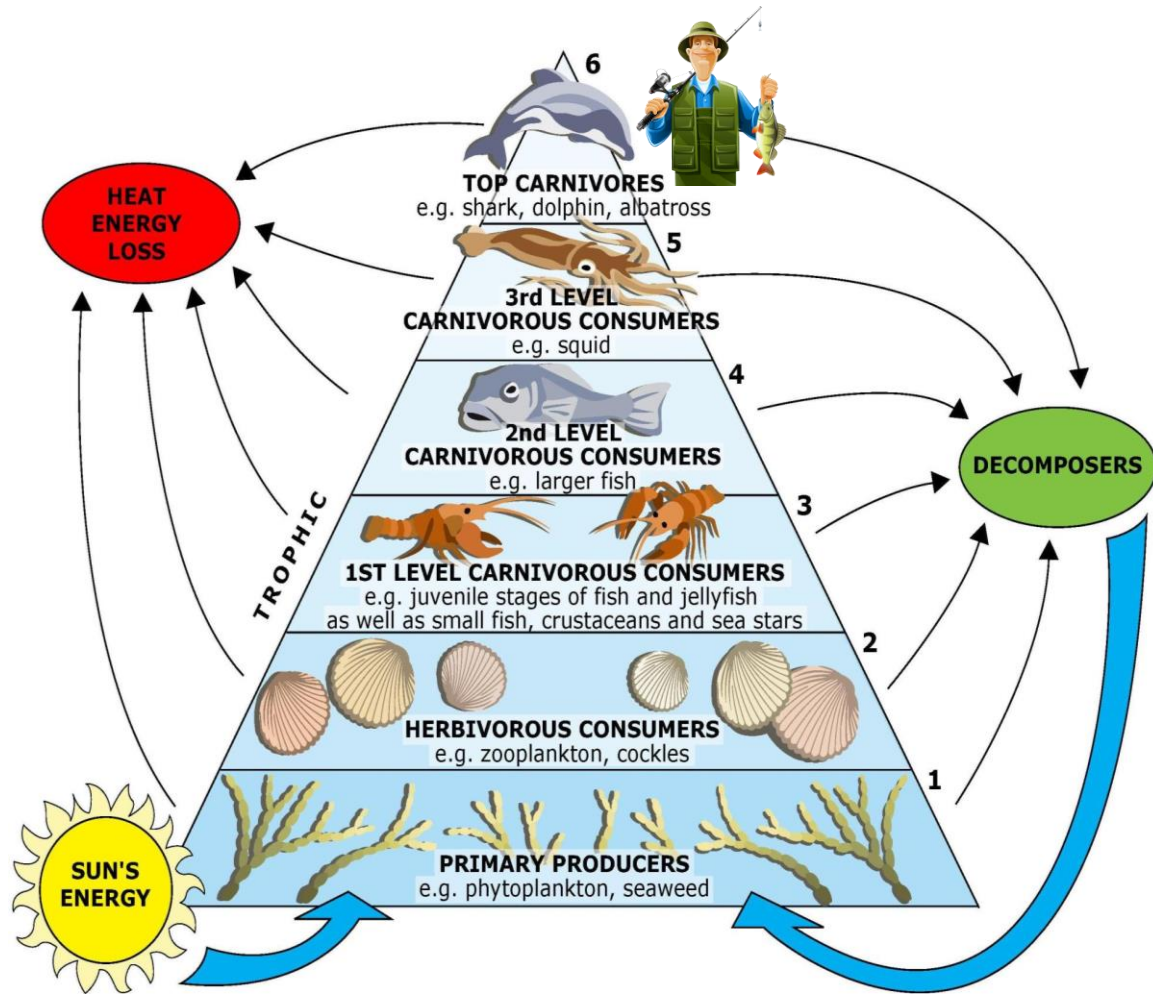
Monk Seal (*Monachus monachus*)

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- top predators in the marine food webs , which leads to Competition
- “Trophic Cascades” and global warming?!
- Bioaccumulation indicators (Lulu case).
- Flag Ship (charismatic) species.



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- Under several threats from human activities:
 - Interaction with fisheries.
 - Ship strikes.
 - Noise.
 - Pollution.
 - Disturbance.



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The Ecosystem Approach

- Common indicator 1: Habitat distributional range (EO1) to also consider habitat extent as a relevant attribute;
- ✓ Common indicator 2: Condition of the habitat's typical species and communities (EO1);
- ✓ Common indicator 3: Species distributional range (EO1 related to marine mammals, seabirds, marine reptiles);
- ✓ Common indicator 4: Population abundance of selected species (EO1, related to marine mammals, seabirds, marine reptiles);
- ✓ Common indicator 5: Population demographic characteristics (EO1, e.g. body size or age class structure, sex ratio, fecundity rates, survival/mortality rates related to marine mammals, seabirds, marine reptiles);
- Common indicator 6: Trends in abundance, temporal occurrence, and spatial distribution of non-indigenous species, particularly invasive, non-indigenous species, notably in risk areas (EO2, in relation to the main vectors and pathways of spreading of such species);
- Common indicator 7: Spawning stock Biomass (EO3);
- Common indicator 8: Total landings (EO3);
- Common indicator 9: Fishing Mortality (EO3)
- Common indicator 10: Fishing effort (EO3)



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- Population Ecology (following the EcAp indicators) :

- What species we have? ➡ Biodiversity
- How many we have? ➡ Density and abundance
- What are they doing? ➡ Feeding and breeding grounds
- Are they doing well? ➡ Threats and human impacts

Mark-recapture (photo-Identification).

Distance Sampling (Line Transects).



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- Mark-recapture assumptions and conditions:
 - Two occasions: in the first, a mark is applied (**Mark Stage**), and in the second, the mark is detected (**Recapture Stage**).
 - Estimates Absolute Density.
 - Little change in individuals' numbers during the study time.
 - Marks are permanent and visible for the Capture stage and permanent during the study period
 - All individuals have equal chance for appearing during the Mark and the Capture periods.
 - Marks do not effect the animal's behavior or life.

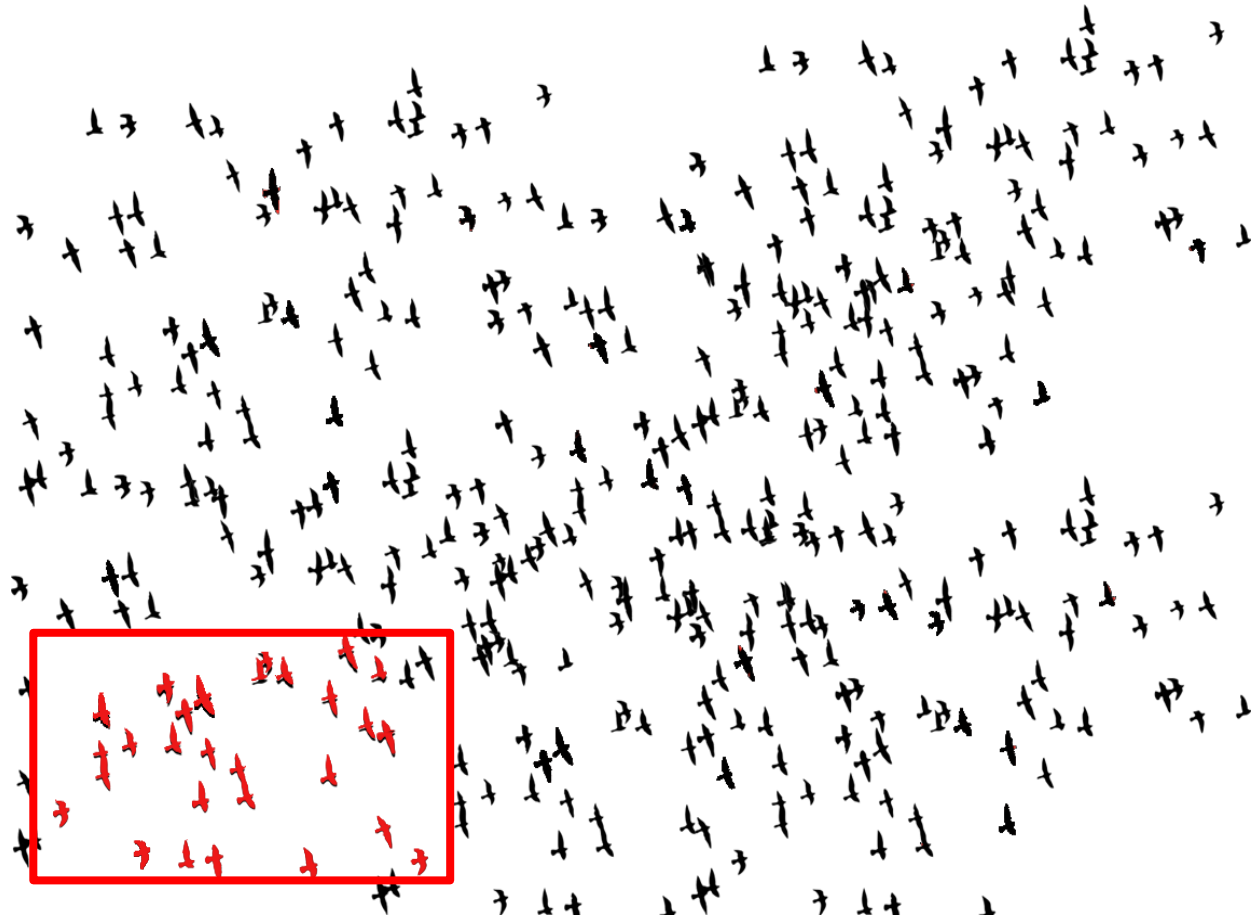


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Mark Stage:

N_t = total abundance (?)

M_t = total number of tagged birds



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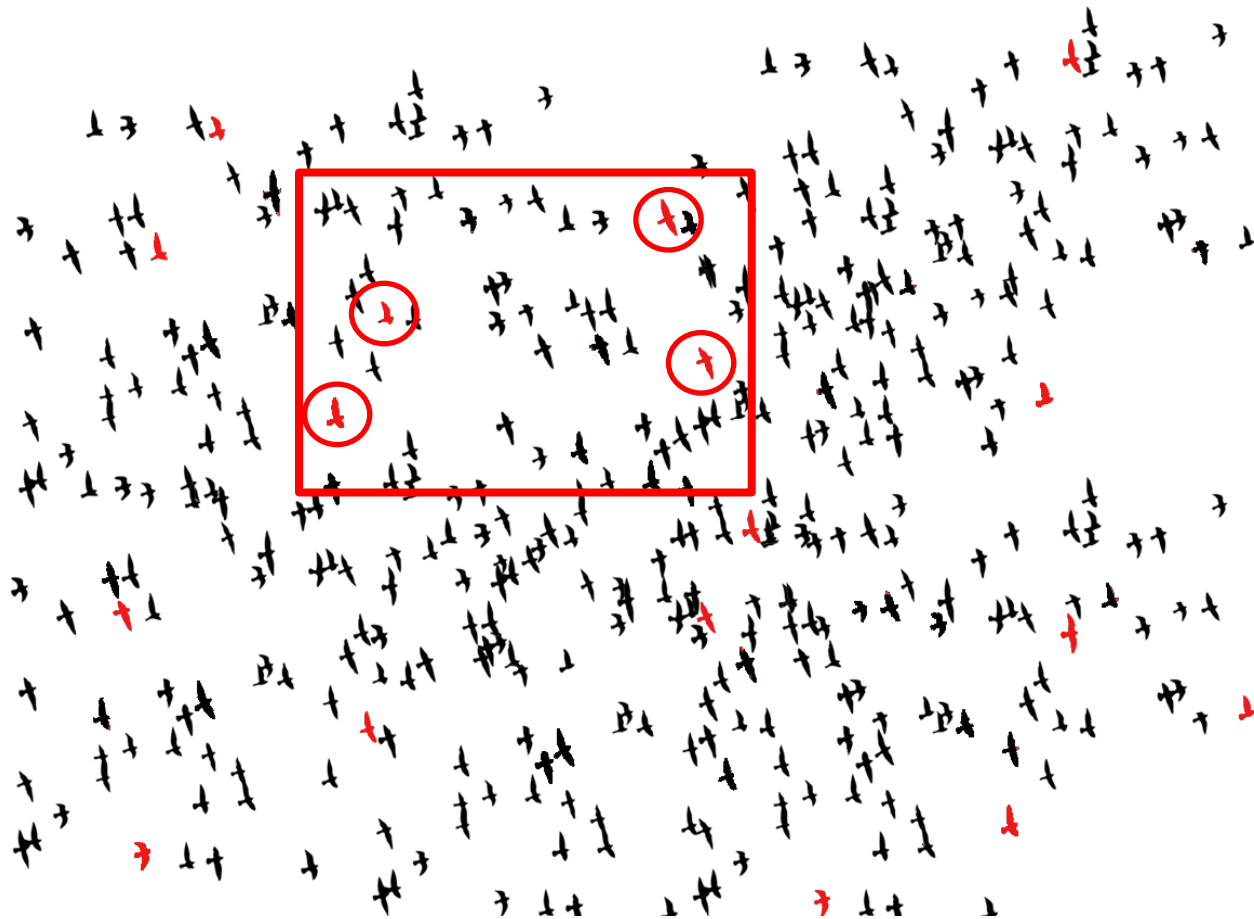
Capture Stage:

N_t = total abundance (?)

M_t = total number of tagged birds

n_i = number of untagged birds sighted

m_i = number of tagged birds sighted

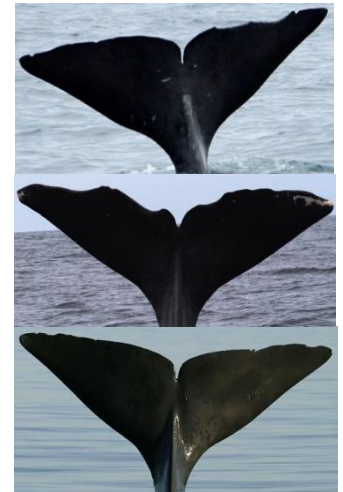


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In marine mammals?

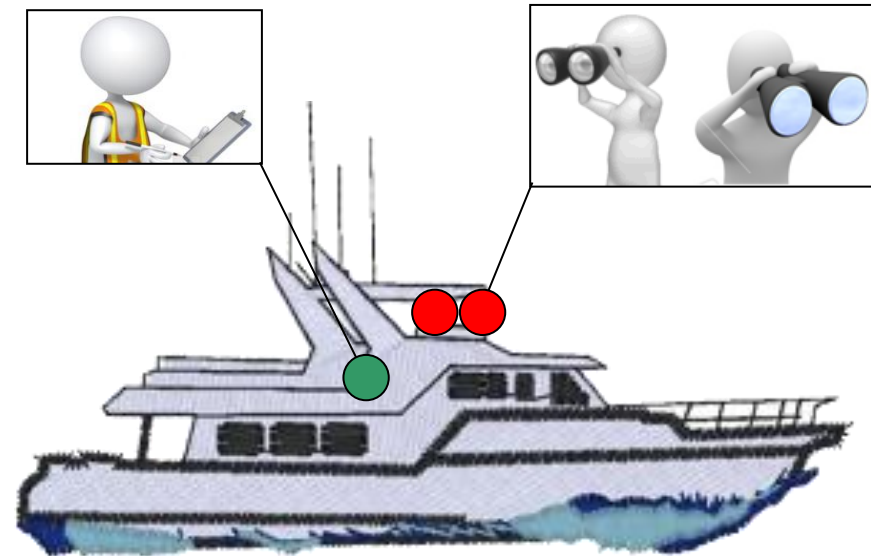
- Marine mammals are sensitive and difficult to catch and tag.
- Difficult to detect (deep divers, long distance movements and migrations, resting in caves).

Solution: Natural distinctive marks on visible parts of the body



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- How is it done?



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- How is it done? Monk Seals?
 - Camera traps in resting caves



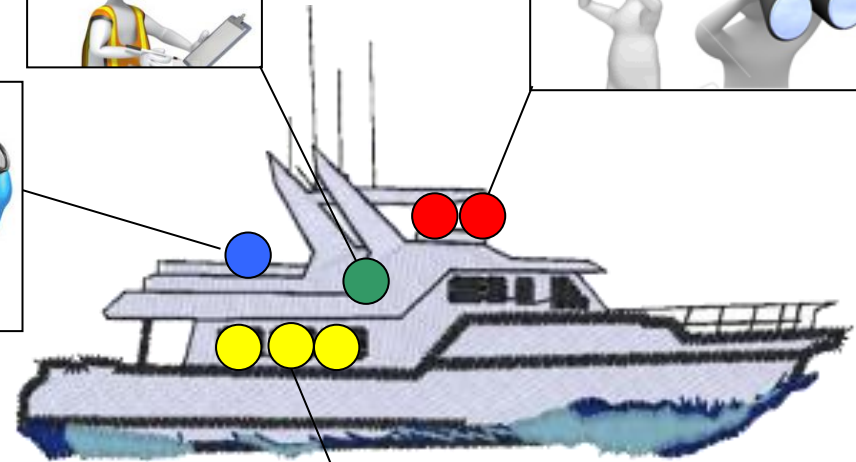
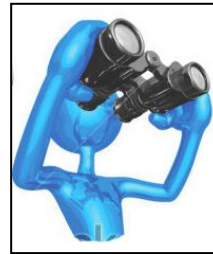
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- Line Transects (distance Sampling) assumptions:
 - estimates the Relative Density (n of animals /sq.km).
 - Survey vessel moves on the trackline and effort is calculated (time and distance).
 - The presence of Senior Independent Expert to estimate error in detection (recommended).
 - Survey vessel or vintage point should be $> 3\text{m}$ from sea surface (the higher the better).
 - Pre-designed trackline (software, e.g. Distance©).

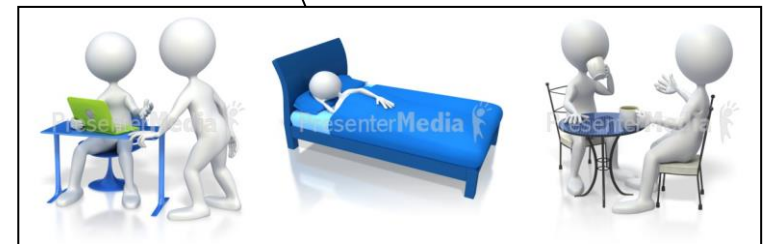


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- How is it done?



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1. Bring your hat, camera, sun lotion, sun glasses.
2. Drink plenty of water and keep hydrated.
3. Sea sickness? Remedy pills
4. Be aware of your movements and surroundings in the boat.
5. Briefing on the boat for further instructions.





Thank you very much

Questions?

