Duże zwierzęta w morzu

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DWARF

Narodowe Centrum Badań i Rozwoju

Polish-Norwegian Research Programme

norway grants

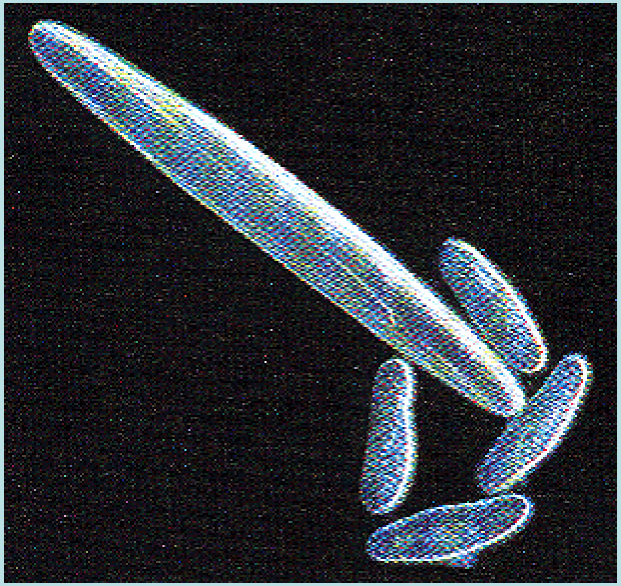
Wielkość organizmu – Święty Graal Ekologii ?

literatura

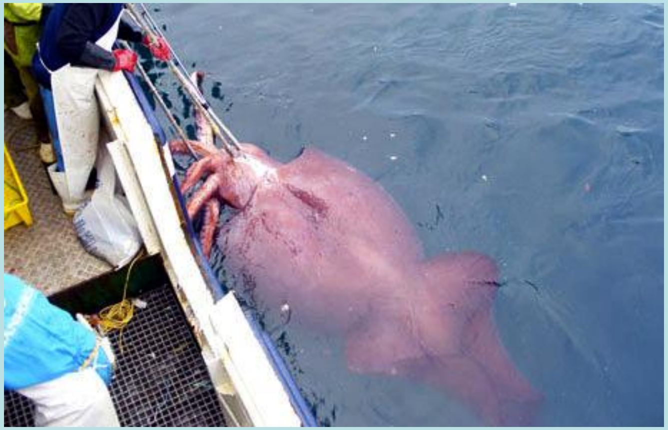
- Woodward et al.. 2005 Body size in ecological networks. TREE 20, 402-409
- Yodzis P 2001 Must top predators be culled for the sake of fisheries ? TREE 16, 78- 84
- Azovsky A 2000 Concept of scale in marine ecology. Web Ecol 1, 28- 34
- Hopcraft JGC et al. 2009 Herbivores, resources and risks. TREE 25, 119-128
- Hillebrand & Azovsky 2001 Body size determines the strength of the latitudinal diversity gradient. Ecography 24, 251- 256
- White EP et al. 2007 Relationships between body size and abundance in ecology. TREE 22, 323-330
- Smith JJ et al. 2009 Transient dwarfism of soil fauna during the PE thermal maximum. PNAS, 106, 17655- 17660
- Pope JJ et al. 2009. Honey, I cooled the cods: Modelling the effect of temperature on the structure of Boreal/Arctic fish ecosystems. DSR 56, 2097-2107

Eurythenes gryllus

Epulopiscium



Bathyonomus

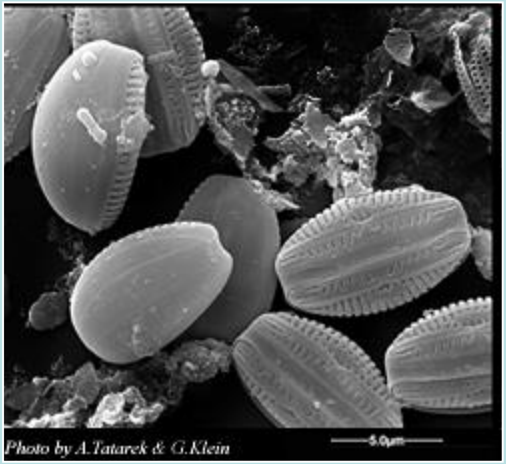




Duży roślinożerca na lądzie

Duży roślinożerca w morzu – 5 cm

rośliny – 0,01mm



Ekologia jest nauką o „case studies”

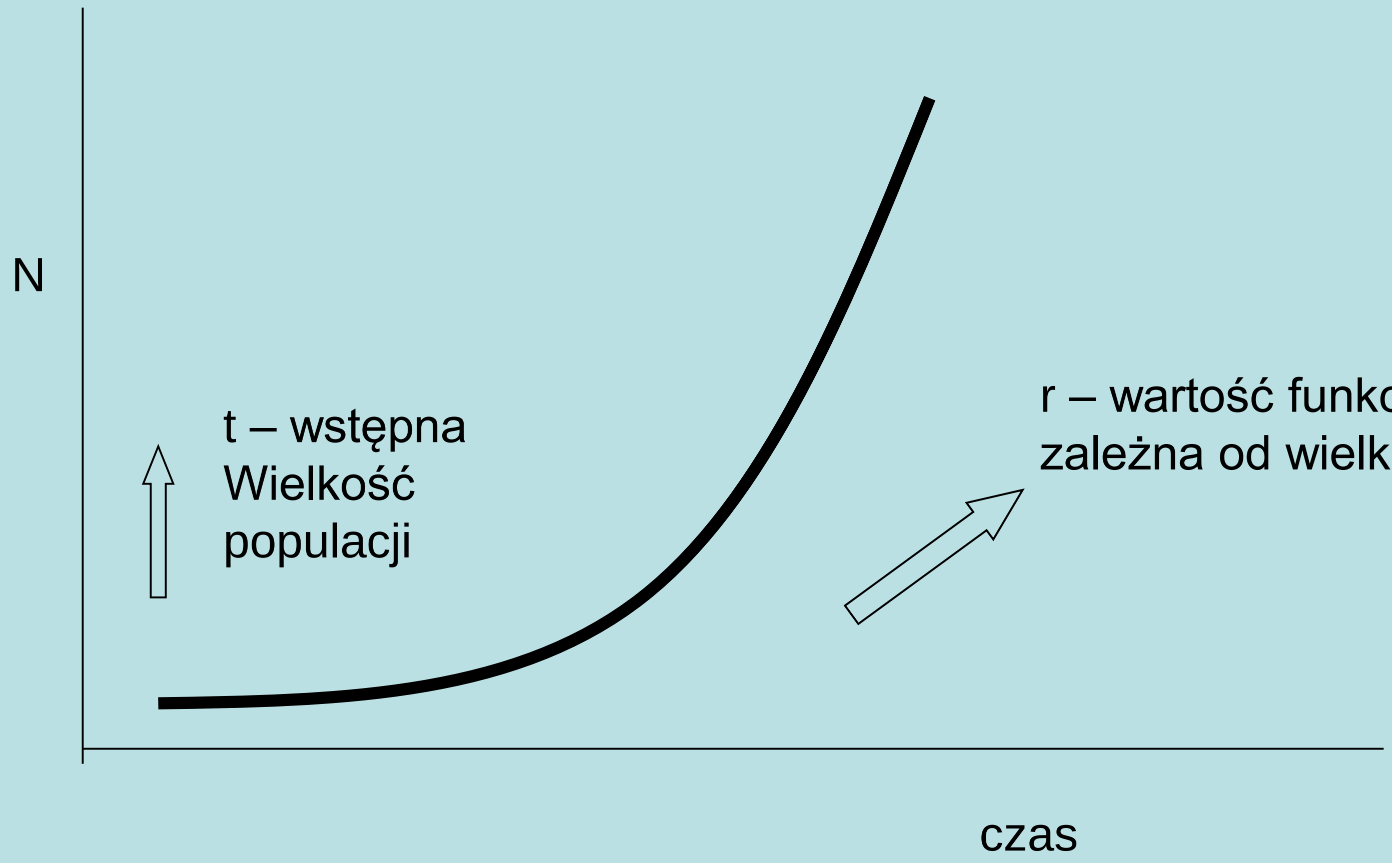
Zależności pomiędzy wielkością osobnika i ekologią wg Woodward i inni , TREE 20, 7, 2005

- Liczba klas wielkości (+)
- Liczebność (–)
- Poziom troficzny (+)
- Szerokość niszy (?)
- Produkcja (+)
- Obrót biogenów (-)
- Bogactwo gatunkowe (-)

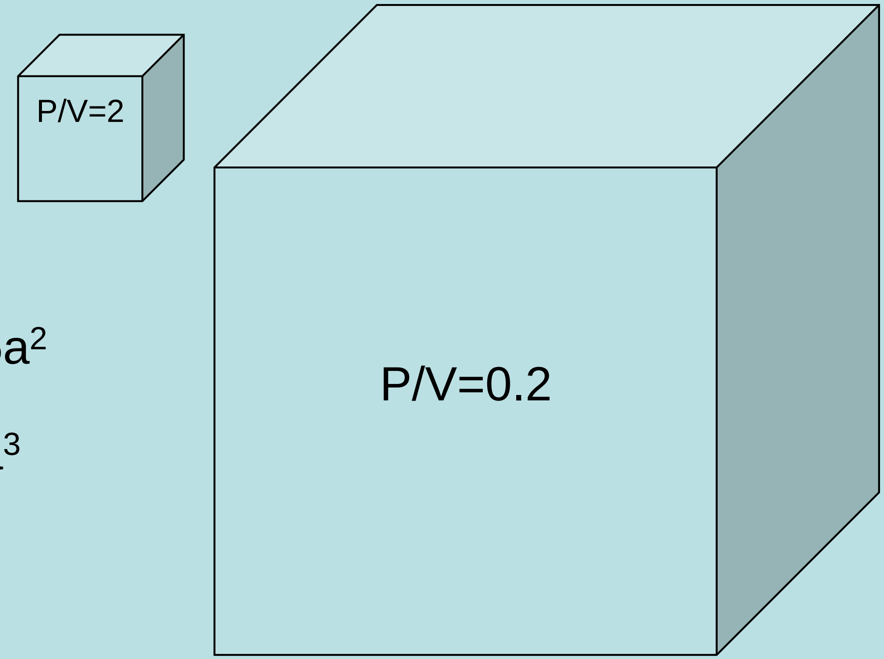
- Potencjalny kanibalizm
- Przewaga małych osobników
- Duże osobniki są drapieżne
- Nisza rozszerza się z wiekiem
- Duże osobniki mają niższe P/B
- Duże osobniki mają wolniejszy metabolizm

Malthus 1798, Prawo wykładniczego wzrostu populacji

$$N = N * e^{r,t}$$



Wielkość zwierzęcia w ekosystemie lądowym
wymiana ciepła



$P=6a^2$

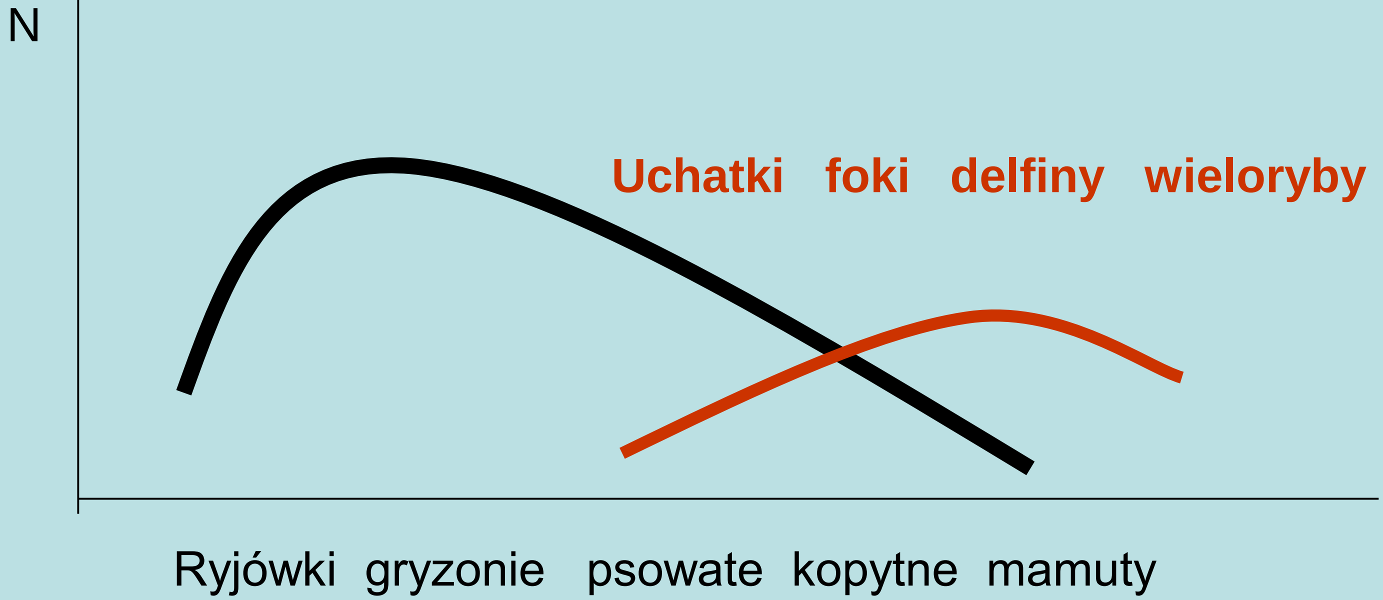
$V=a^3$

Amplituda temp. do 80 stopni

Szkielet wewnętrzny

Morskie zwierzę stałocieplne nie może być myszą

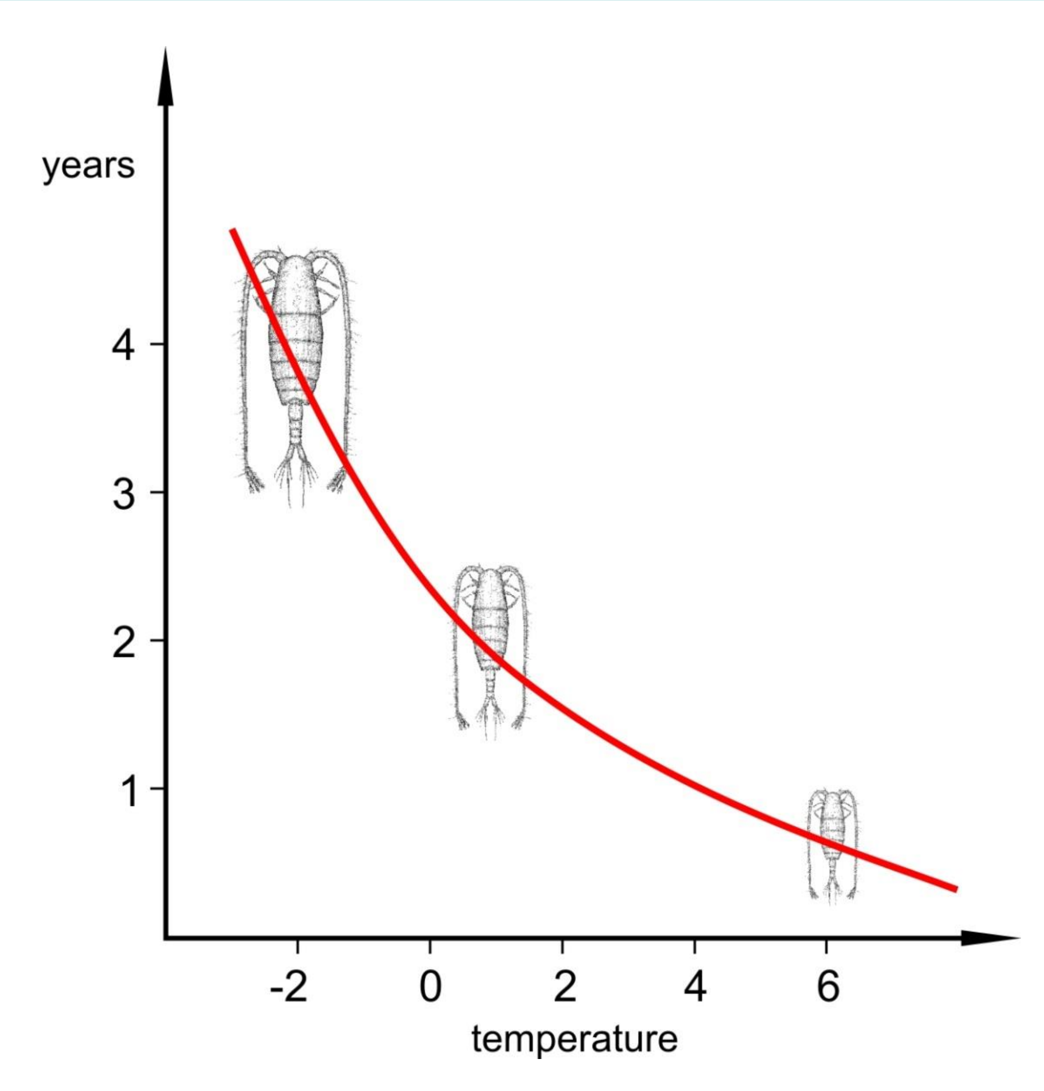
Utrata ciepła w wodzie 25X większa niż w powietrzu

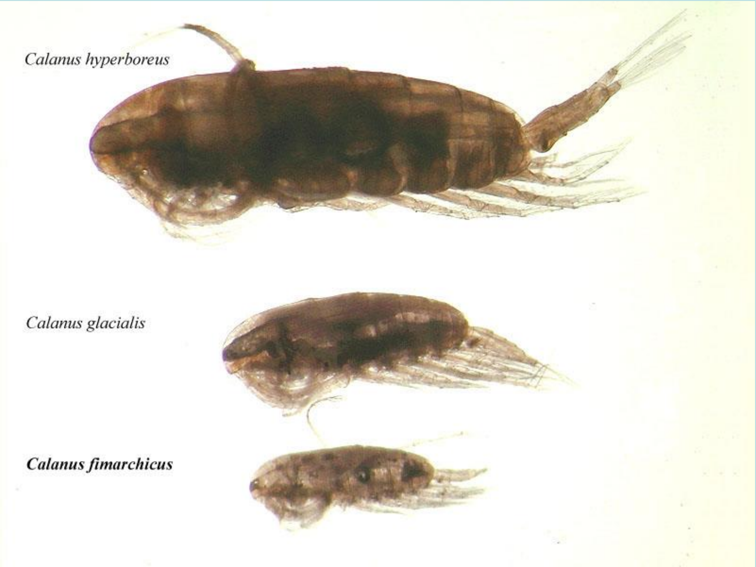


Lądowe zwierzę bezkręgowe nie może być kałamarnicą olbrzymią

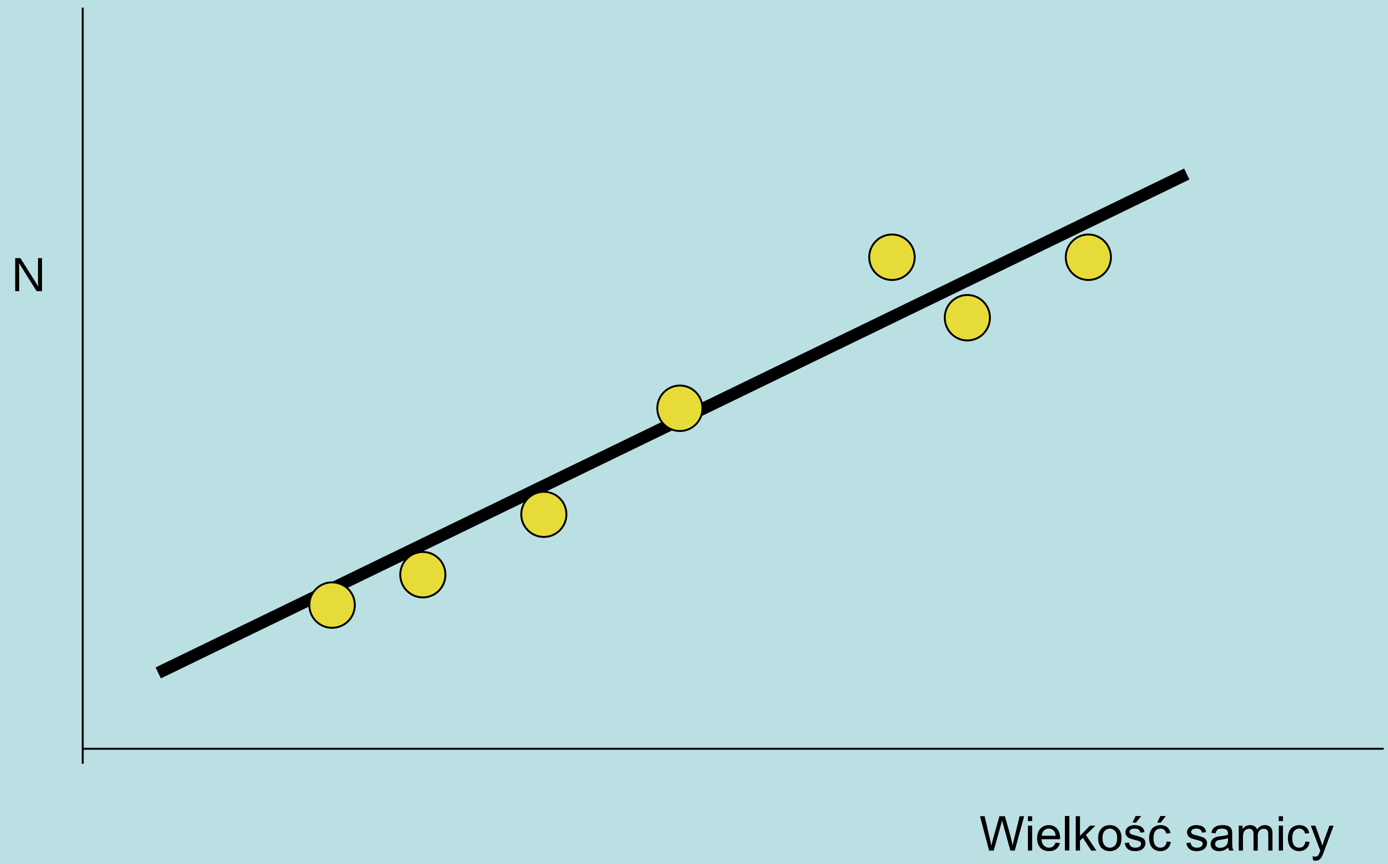
Siła wyporu w wodzie

Zimna woda – długie życie, duże rozmiary
Bergman 1847

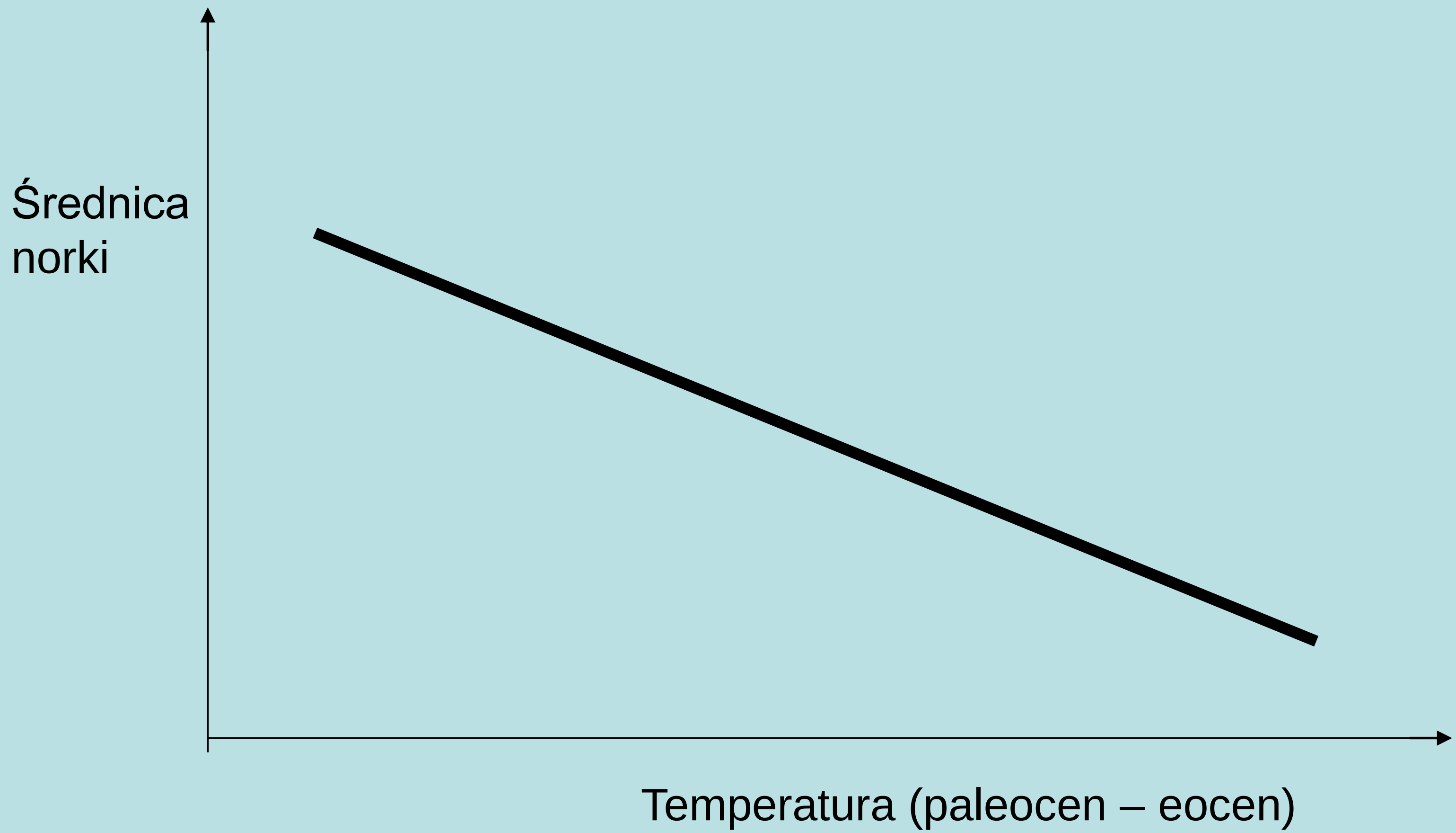




Jensen 1958,
zależnośc ilości jaj od wielkości ryby/skorupiaka



Smith i inni 2009, PNAS 106, 42
wpływ temperatury na wielkość organizmów glebowych w trzeciorzędzie



Wielkość organizmu i sieć troficzna wg. Aquatic Food Web, 2005

- Złożoność sieci troficznej spada ze wzrostem energii w systemie, P/B zwiększa się (preferowane małe, szybko rosnące organizmy)

- W systemach o niskiej energii, złożoność sieci troficznej rośnie, P/B zwiększa się, (przewagę uzyskują duże, wolno rosnące organizmy)

Azovsky 2000, OIKOS, Web Ecology

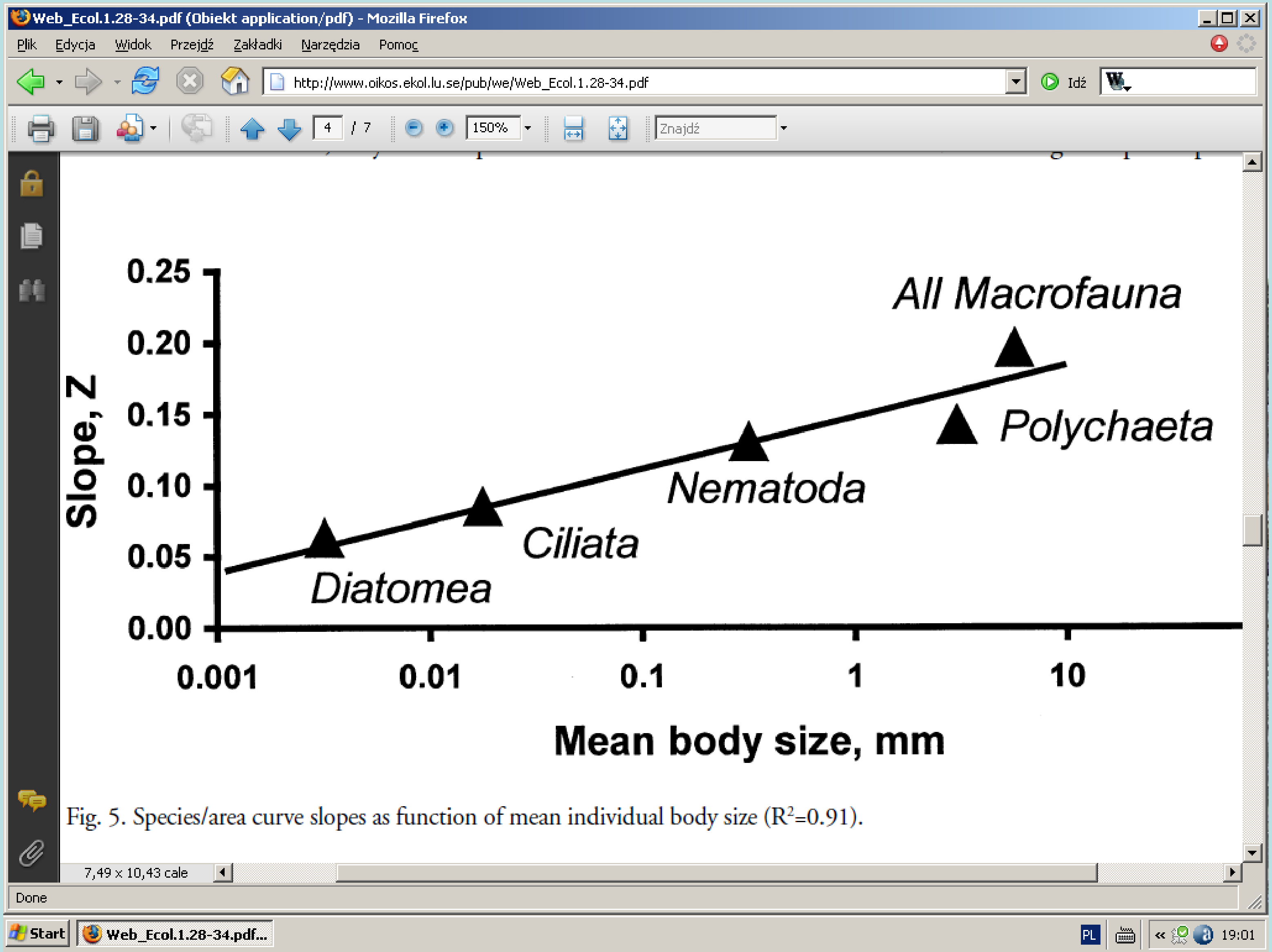
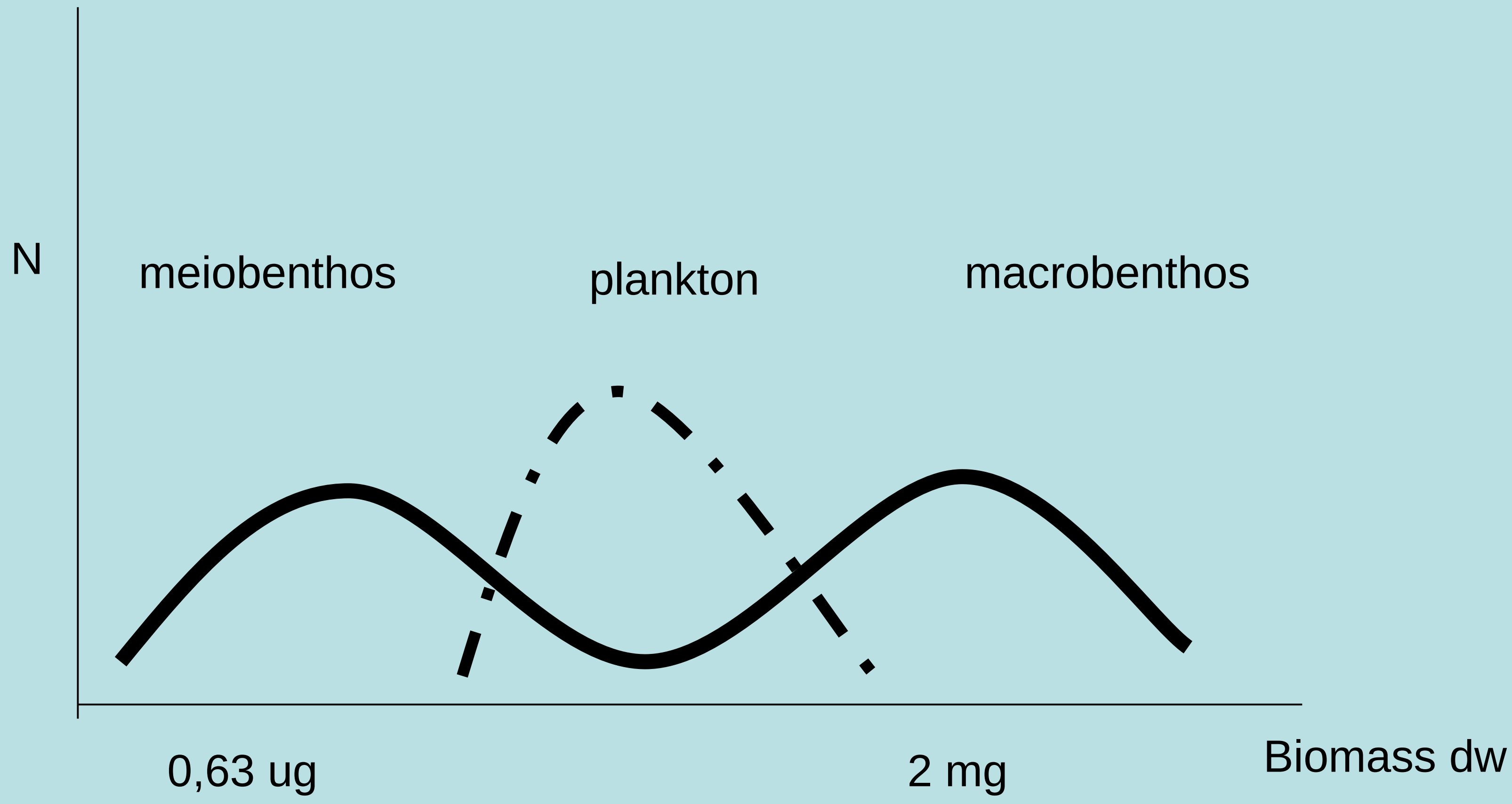
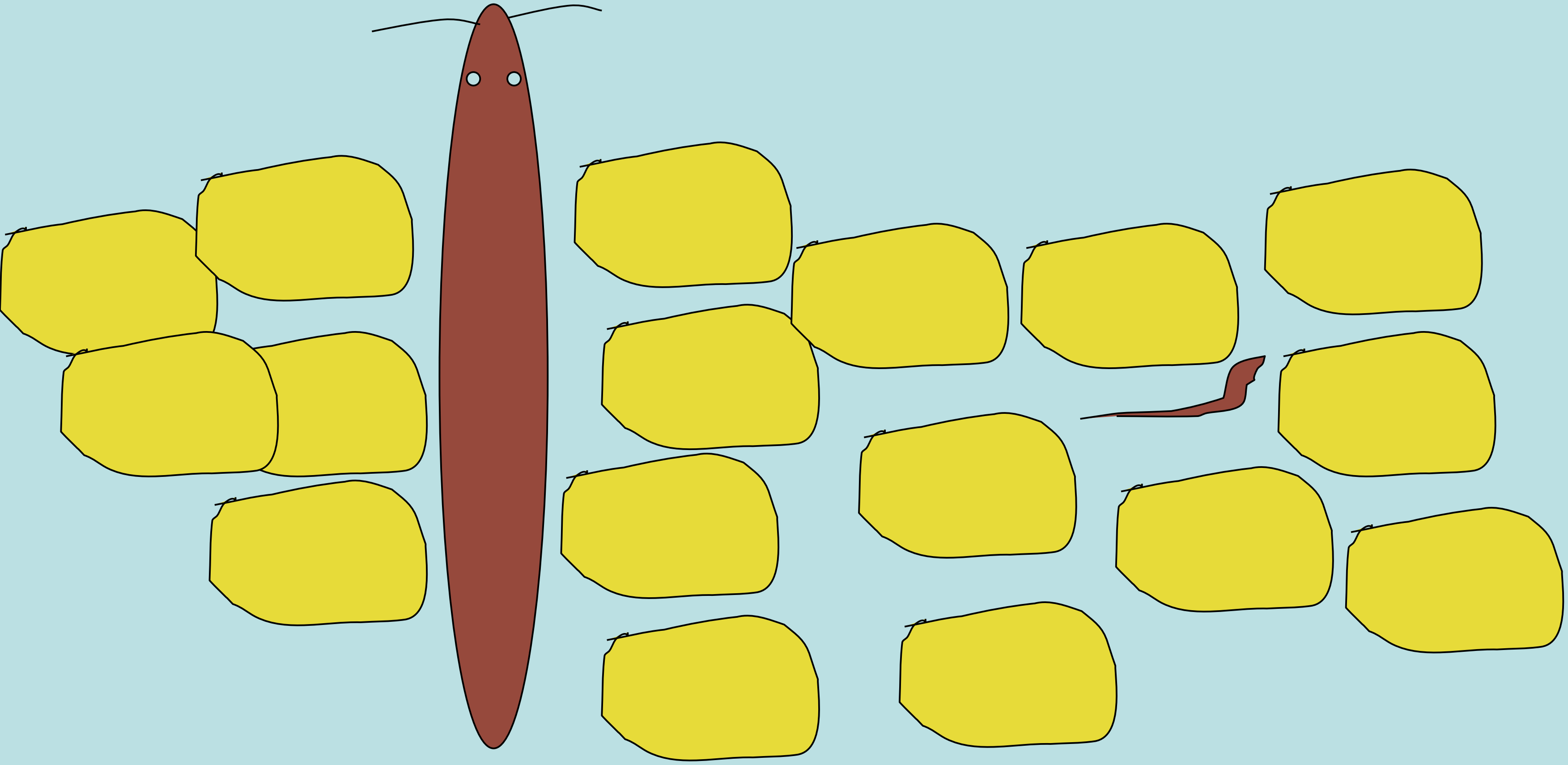


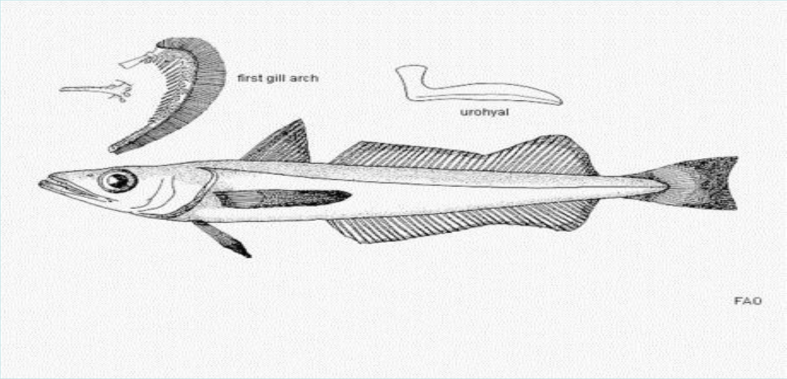
Fig. 5. Species/area curve slopes as function of mean individual body size (R^2=0.91).

Warwick 1992, size structure in benthos

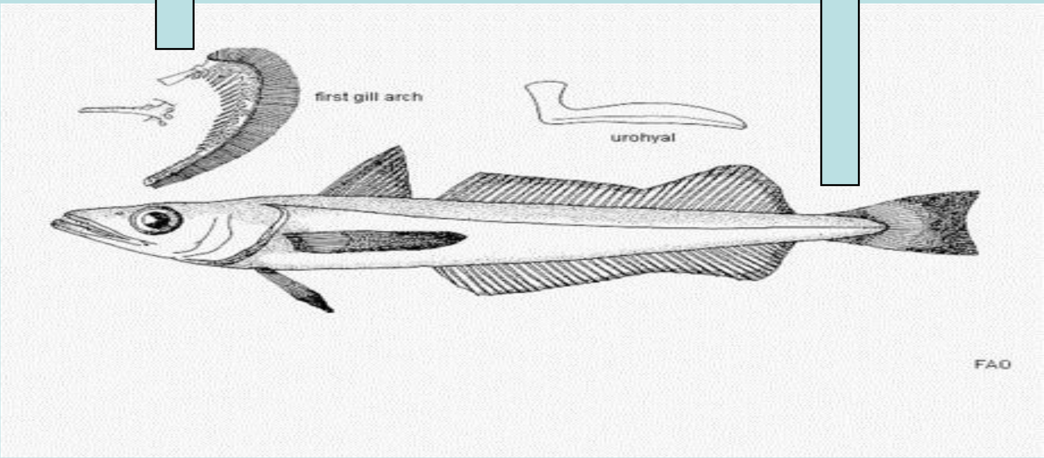




RPA – Benguela Current – Man/Arctocephalus/Merlucius

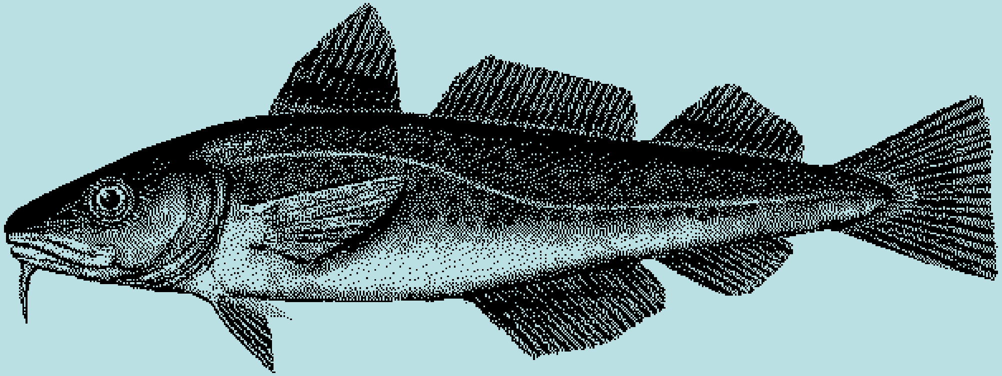



ALASKA-IN-PICTURES.COM

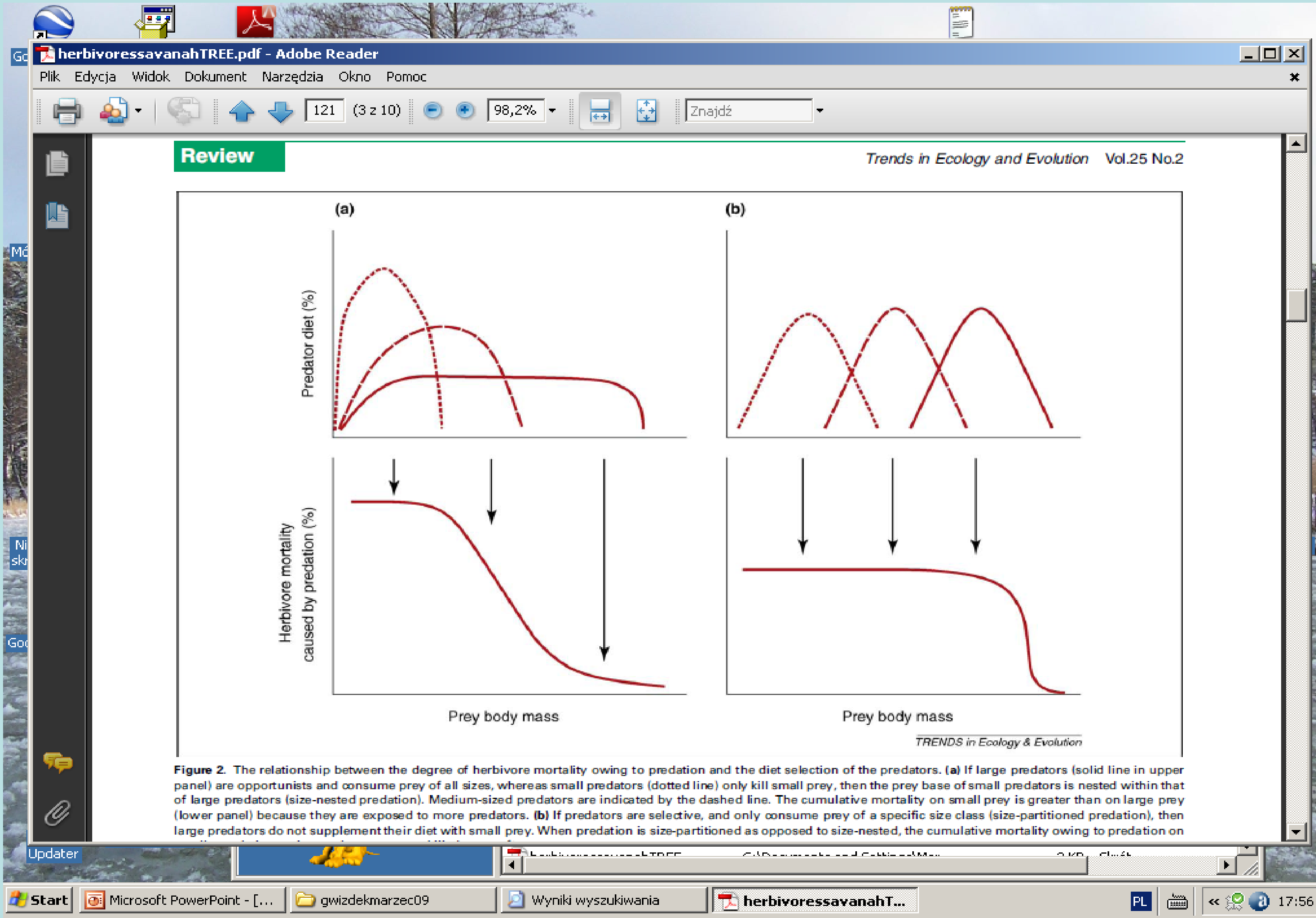

first gill arch
urohyal
FAO

Morze Barentsa- czterech dużych drapieżników

Prawie równo po około 25%

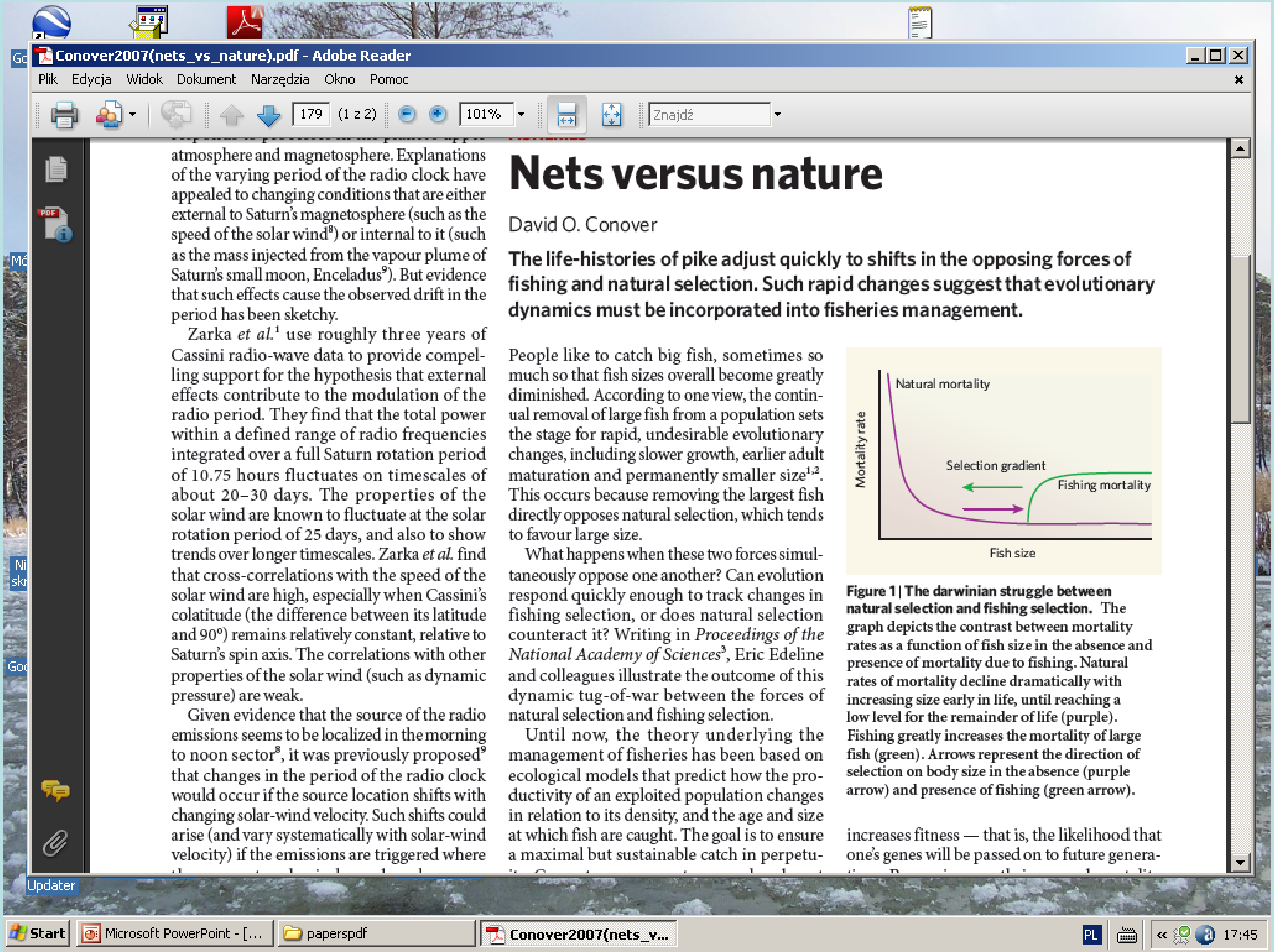


Hopcraft i inni 2009, TREE – selective and oportunistic predators



Do końca XIX w dobór łowiecki to
usuwanie największych osobników z populacji

100 lat później zauważyli to biolodzy morza……



atmosphere and magnetosphere. Explanations of the varying period of the radio clock have appealed to changing conditions that are either external to Saturn's magnetosphere (such as the speed of the solar wind[8]) or internal to it (such as the mass injected from the vapour plume of Saturn's small moon, Enceladus[9]). But evidence that such effects cause the observed drift in the period has been sketchy.

Zarka *et al.*[1] use roughly three years of Cassini radio-wave data to provide compelling support for the hypothesis that external effects contribute to the modulation of the radio period. They find that the total power within a defined range of radio frequencies integrated over a full Saturn rotation period of 10.75 hours fluctuates on timescales of about 20–30 days. The properties of the solar wind are known to fluctuate at the solar rotation period of 25 days, and also to show trends over longer timescales. Zarka *et al.* find that cross-correlations with the speed of the solar wind are high, especially when Cassini's colatitude (the difference between its latitude and 90°) remains relatively constant, relative to Saturn's spin axis. The correlations with other properties of the solar wind (such as dynamic pressure) are weak.

Given evidence that the source of the radio emissions seems to be localized in the morning to noon sector[8], it was previously proposed[9] that changes in the period of the radio clock would occur if the source location shifts with changing solar-wind velocity. Such shifts could arise (and vary systematically with solar-wind velocity) if the emissions are triggered where

Nets versus nature

David O. Conover

The life-histories of pike adjust quickly to shifts in the opposing forces of fishing and natural selection. Such rapid changes suggest that evolutionary dynamics must be incorporated into fisheries management.

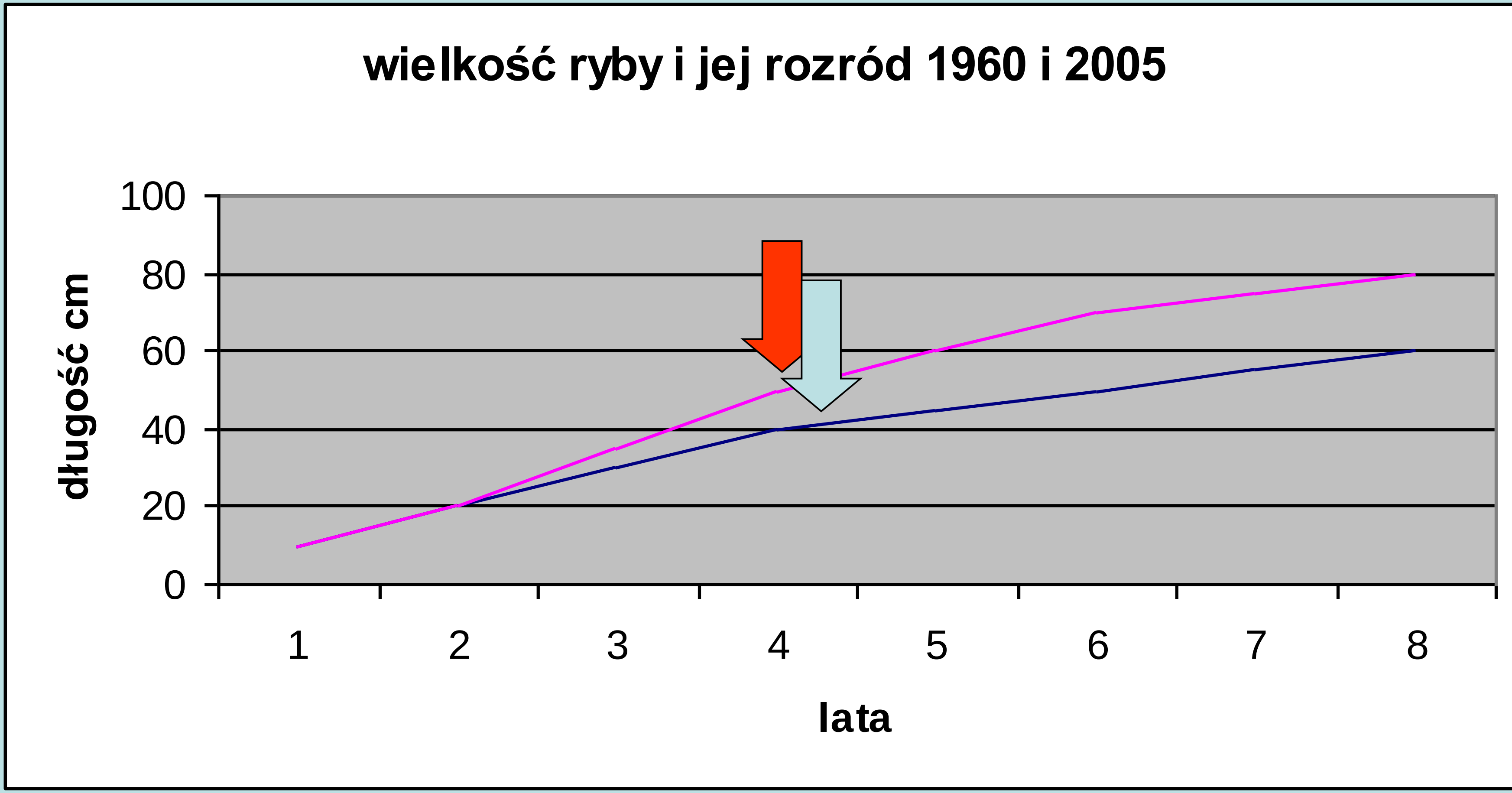
People like to catch big fish, sometimes so much so that fish sizes overall become greatly diminished. According to one view, the continual removal of large fish from a population sets the stage for rapid, undesirable evolutionary changes, including slower growth, earlier adult maturation and permanently smaller size[1,2]. This occurs because removing the largest fish directly opposes natural selection, which tends to favour large size.

What happens when these two forces simultaneously oppose one another? Can evolution respond quickly enough to track changes in fishing selection, or does natural selection counteract it? Writing in *Proceedings of the National Academy of Sciences*[3], Eric Edeline and colleagues illustrate the outcome of this dynamic tug-of-war between the forces of natural selection and fishing selection.

Until now, the theory underlying the management of fisheries has been based on ecological models that predict how the productivity of an exploited population changes in relation to its density, and the age and size at which fish are caught. The goal is to ensure a maximal but sustainable catch in perpetu-

Figure 1 | The darwinian struggle between natural selection and fishing selection. The graph depicts the contrast between mortality rates as a function of fish size in the absence and presence of mortality due to fishing. Natural rates of mortality decline dramatically with increasing size early in life, until reaching a low level for the remainder of life (purple). Fishing greatly increases the mortality of large fish (green). Arrows represent the direction of selection on body size in the absence (purple arrow) and presence of fishing (green arrow).

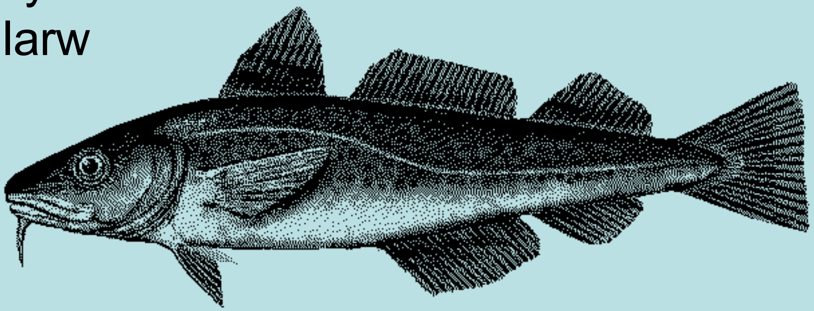
increases fitness — that is, the likelihood that one's genes will be passed on to future genera-

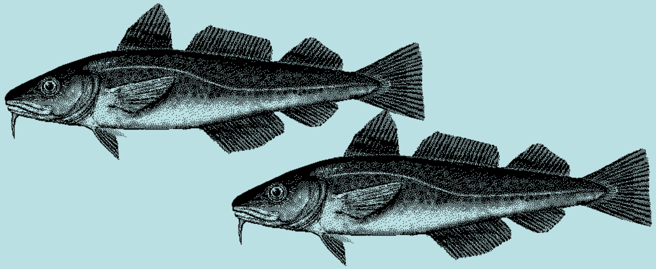


Wg Dickman i inni 2009, HELCOM WG

Efekt ewolucyjny intensywnych połowów

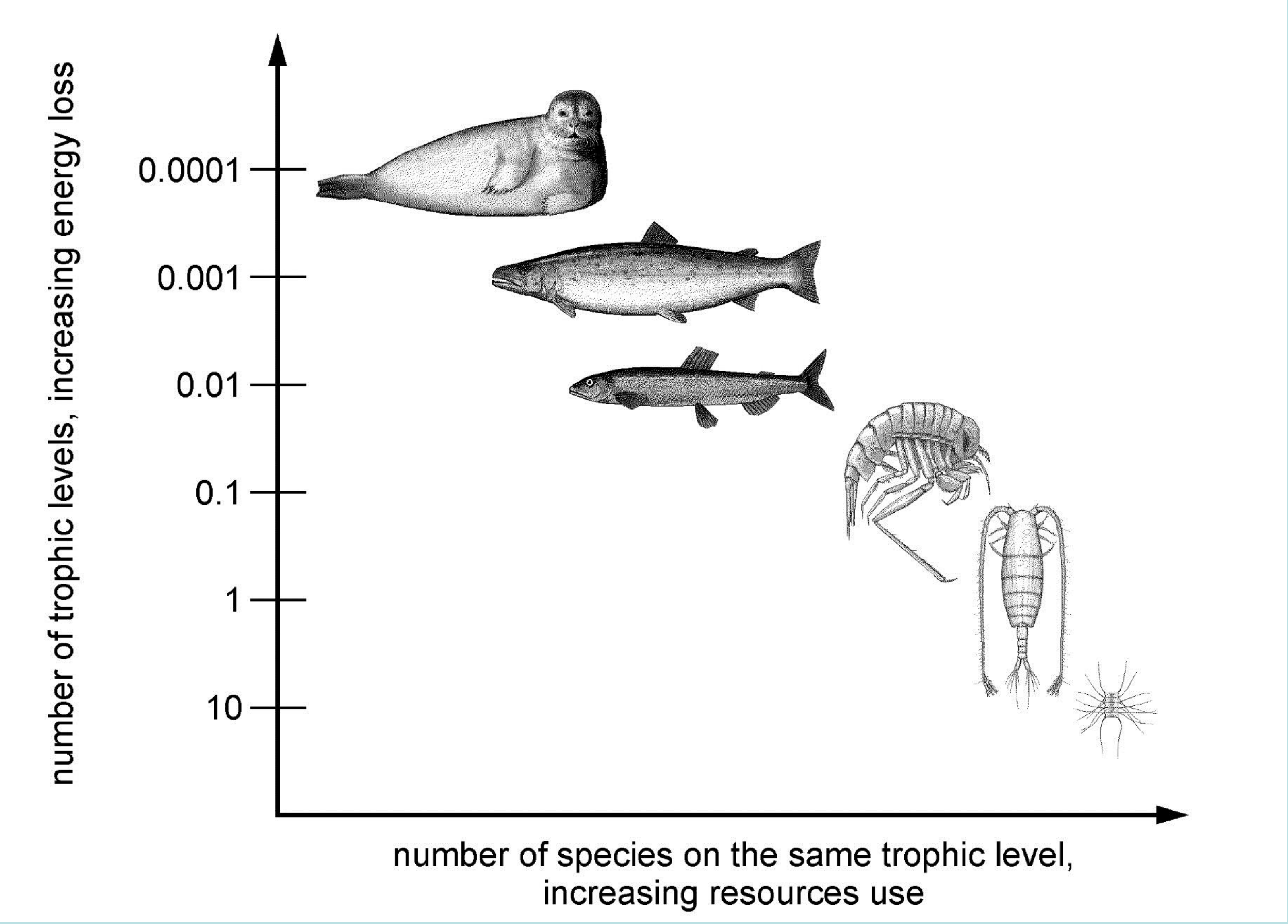
Duży osobnik – więcej, większej ikry
Większy odsetek przeżywających larw





Selekcja w kierunku, coraz mniejszych,
szybciej rozradzających się osobników

Gatunki i poziomy troficzne



Wiadomość dla zarządu

Jeżeli musisz konkurować o zasoby to najlepiej z foką, od biedy z rybą, nie próbuj z żebropławem, a z wirusem nie masz szans