WF4313/6613-Fisheries Management

Class 8 –Advanced population dynamics

Announcements

- Laboratory-Tuesday @ 1pm.
  - Technical issues resolved… hopefully
- Exam I September 20th…

Cost of illegal harvest

September 5, 2017 5:25am AAP, PerthNow

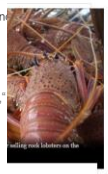
Black market lobsters cost man $94k

Graham Thomas Davies from Yanchep has been ordered to pay a fine and costs of $94,409.35 after pleading guilty to multiple charges following an investigation by the Department of Primary Industries and Regional Development Fisheries.

"This outcome highlights how serious the court considers these offences," compliance manager Todd A'Vard said on Wednesday.

Davies, 67, pleaded guilty in Joondalup Magistrates Court on August 30.

The department says Davies sold more than 300 rock lobsters he had caught recreationally between November 2015 and March 2016.



m lobster fishing for two
rs on the black market.

Graham Thomas Davies from Yanchep has been ordered to pay a fine and costs of $94,409.35 after pleading guilty to multiple charges following an investigation by the Department of Primary Industries and Regional Development Fisheries.

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…Red fish, blue fish

August 29, 2017

The traceability rule, according to the opinion, was intended to help track that journey and protect from the vulnerabilities inherent in the "catch-to-table distribution chain."

WASHINGTON (CN) – Invoking Dr. Seuss, a federal judge on Monday

"It turns out that there (sic) a lot more fish in the sea than even Dr. Seuss imagined. So many, in fact, that countries, including the United States, historically have had difficulty keeping track of the seafood that crosses their borders," the opening paragraph of the ruling says.

the traceability rule, which requires importers to document the supply chain of imports from their origin to their arrival in the U.S., was lawfully implemented by the National Marine Fisheries Service.

As such, Mehta said it "weathers the storm" of the challenge.

To highlight the complexity of the "catch-to-table distribution chain," Mehta turned to Dr. Seuss.

Mortality-Predation

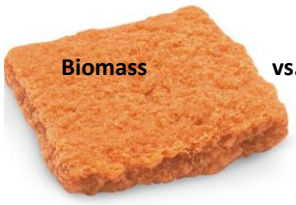
A Woman Got Smacked In The Face By A Catfish That "Fell Out Of The Sky"

Julia Reinstein
BuzzFeed News Reporter

It seemed like just a normal Labor Day for Lisa Lobree. She and a friend were walking to a fitness class, when she heard a rustling in a tree above her. It was then that something incredibly weird happened.

Class Topics

Age structure & population dynamics

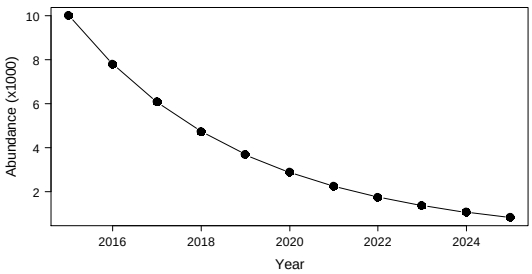


vs.

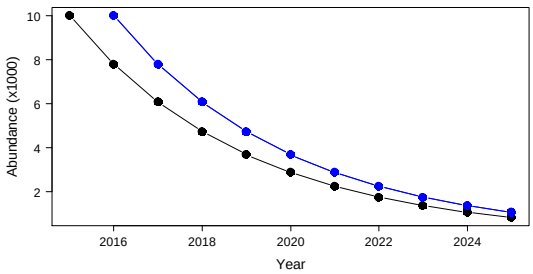
Year class dynamics

Year	Abundance
2015	10000
2016	7800
2017	6084
2018	4745
2019	3701
2020	2887
2021	2252
2022	1757
2023	1370
2024	1069
2025	833

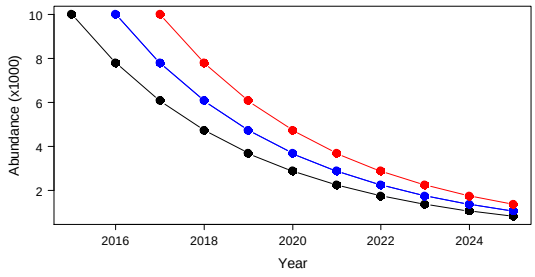
Year class dynamics



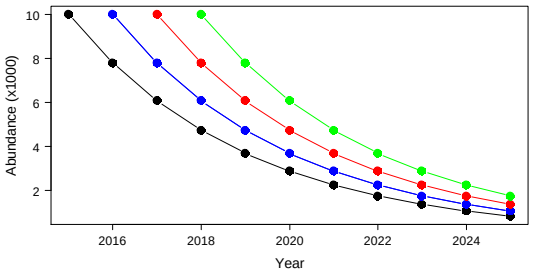
Multiple year-classes



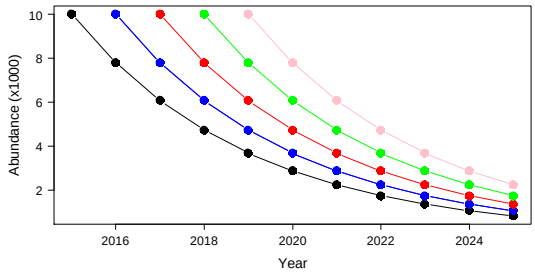
Multiple year-classes



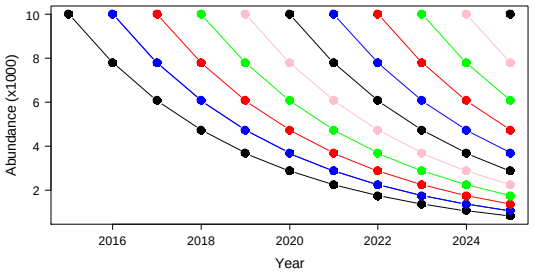
Multiple year-classes



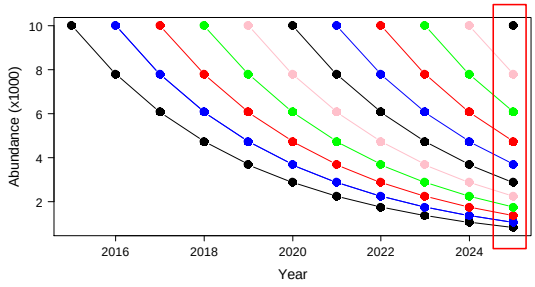
Multiple year-classes



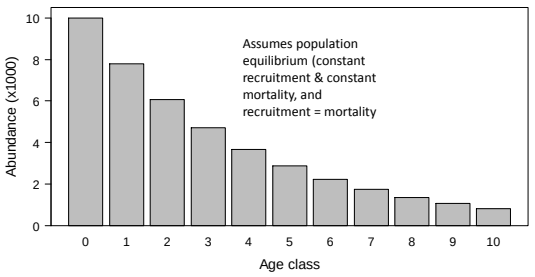
At any given year



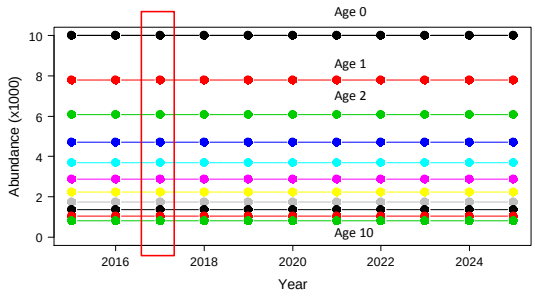
At any given year



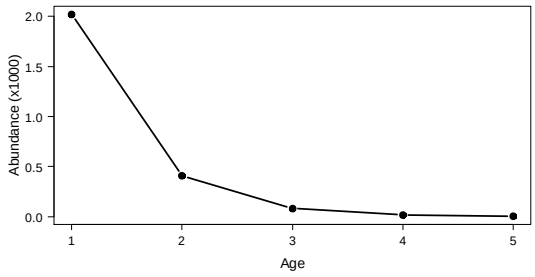
Stable age distribution



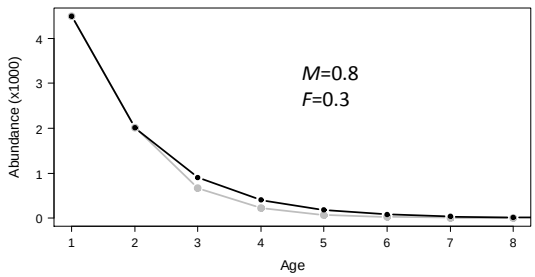
Equilibrium age distribution



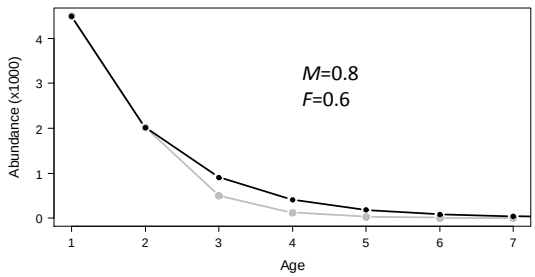
Fishing mortality depends on size



Effect of fishing



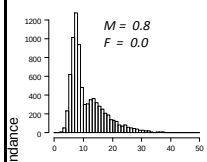
Effect of fishing



Size structure

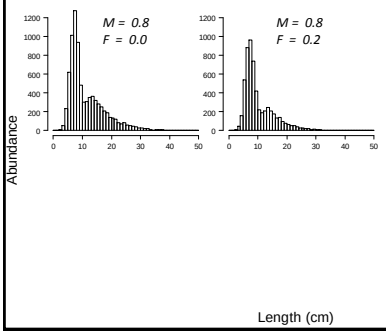
Lets look at a population of Black Crappie with a natural mortality rate (*M*) of 0.8 for the following levels of fishing mortalities: 0.0, 0.2, and 0.4, 0.6, 0.8

Size structure

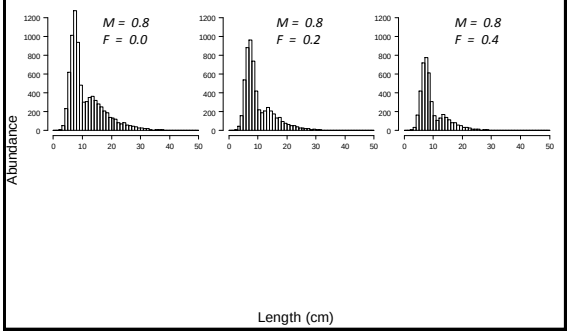


Length (cm)

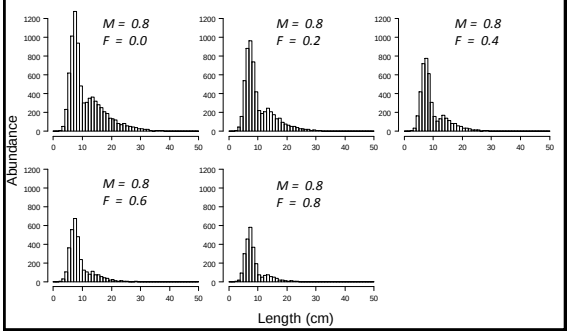
Size structure



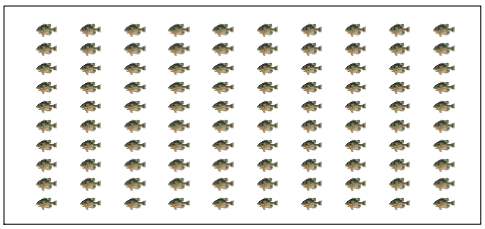
Size structure



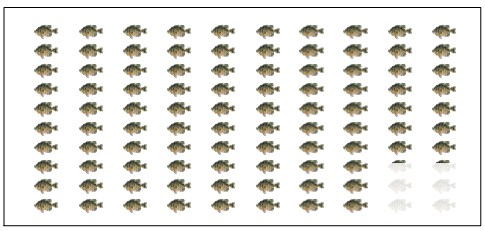
Size structure



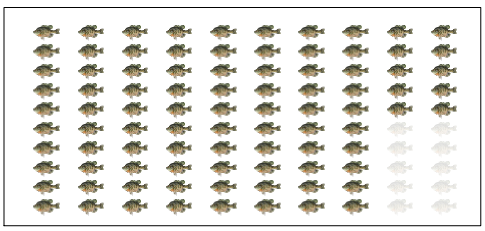
A cohort of recruits (yr = 2015.0)



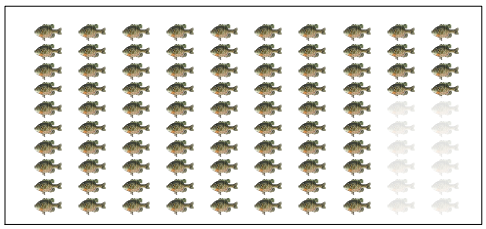
Growth & survival (yr = 2015.15)



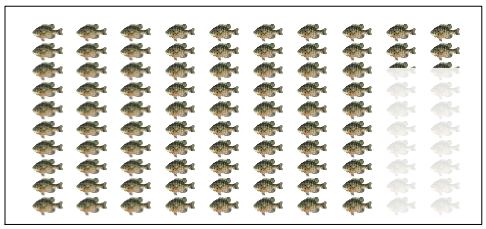
Growth & survival (yr = 2015.30)



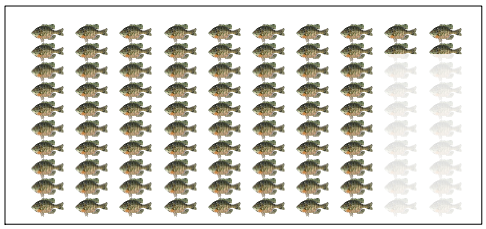
Growth & survival (yr = 2015.45)



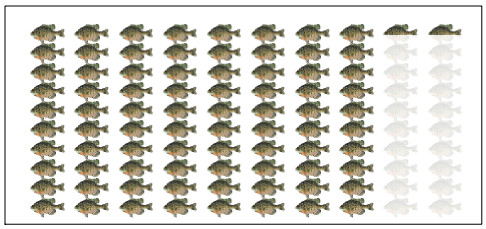
Growth & survival (yr = 2015.60)



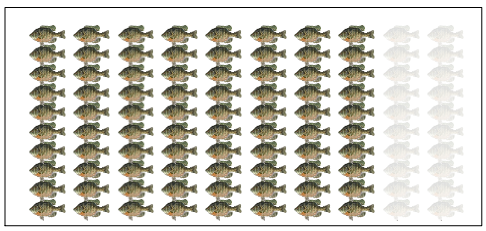
Growth & survival (yr = 2015.75)



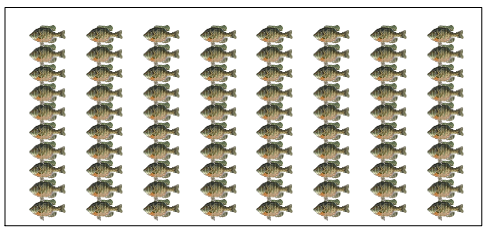
Growth & survival (yr = 2015.90)



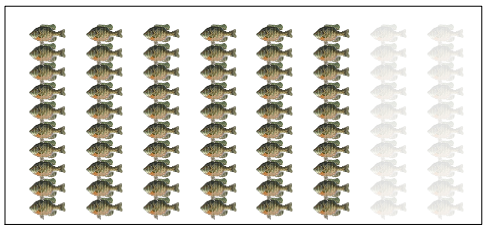
Growth & survival (yr = 2016.0)



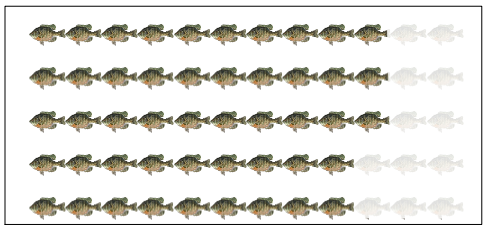
Growth & survival (yr = 2016.0)



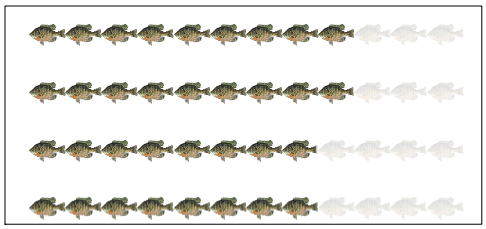
Growth & survival (yr = 2017.0)



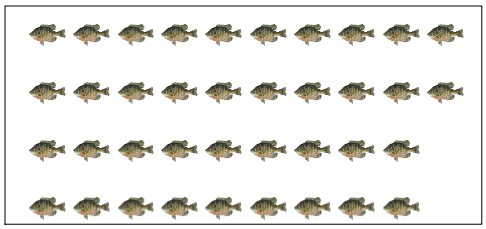
Growth & survival (yr = 2018.0)



Growth & survival (yr = 2019.0)



Growth & survival (yr = 2020.0)

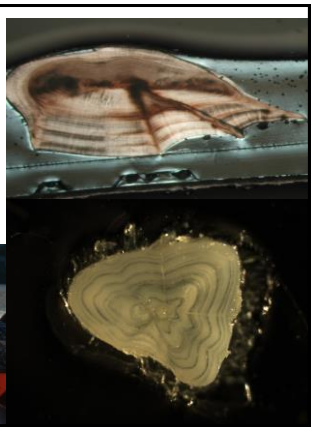


Growth process in fish

The assimilation of food as biomass (i.e., tissue). Primarily refers to somatic tissue but also includes gonad tissue.

- Fish adding **weight** over **time**
  1. **Relate time (age) to length**
  2. **Relate length to weight**

Age & Growth



Growth models

- Relate the age of fish in a population to their length or weight
  - Provide equations that describe growth using parameter estimates that can be used to make comparisons within and among populations
  - These equations are regression models of the size of the fish over time
  - Model selection should be based on fit and interpretability.

The von Bertalanffy growth model

Widely used in fisheries science – many alternative forms, but the basic model for length is:

$$Length = Length_{\infty} \cdot (1 - e^{-K \cdot (age - t_0)})$$

Where:

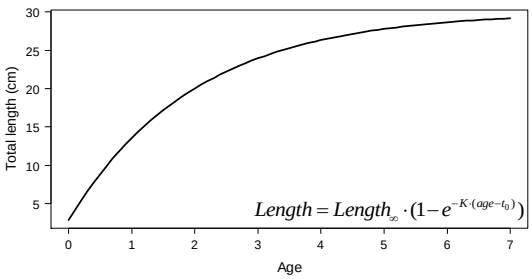
$Length_t$ is the estimated *mean* length at time t,

$Length_{\infty}$ is the asymptotic or theoretical *mean* maximum length,

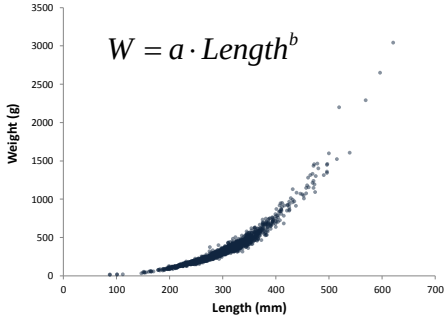
K is a growth coefficient; describes how quickly L_{∞} is reached, and

t_0 is the theoretical age when length equals 0; fixes curve position on axis.

Age-length



Length-weight relationship



Straightening the curve

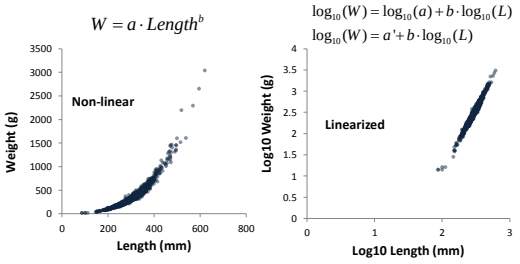
Law of logarithms

$$W = a \cdot L^b$$

$$\log_{10}(W) = \log_{10}(a \cdot L^b)$$

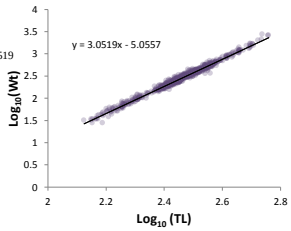
$$\log_{10}(W) = \log_{10}(a) + b \cdot \log_{10}(L)$$

Estimating weight from length

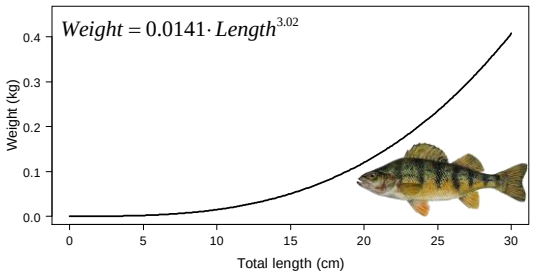


Can estimate weight from length!

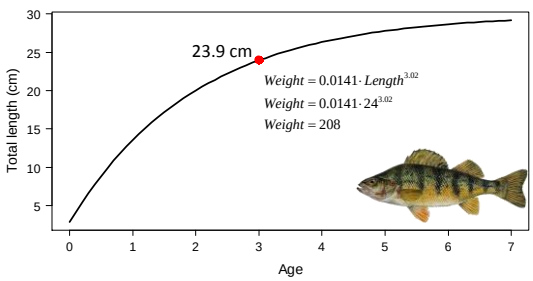
$$Weight = 10^{-5.0557} \cdot Length^{3.0519}$$
$$Weight = 10^{-5.0557} \cdot 400^{3.0519}$$
$$Weight = 768\,g$$



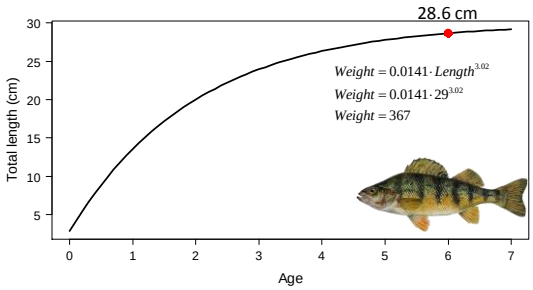
Length-weight



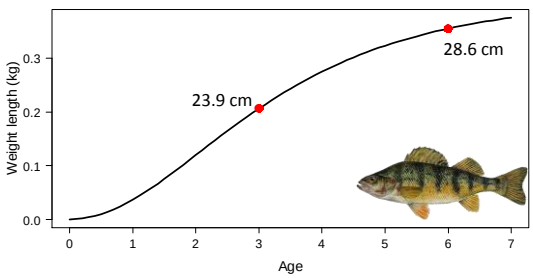
Weight for an age-3 fish



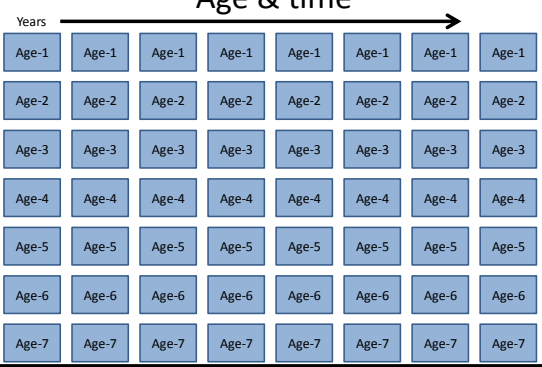
Weight for an age-6 fish

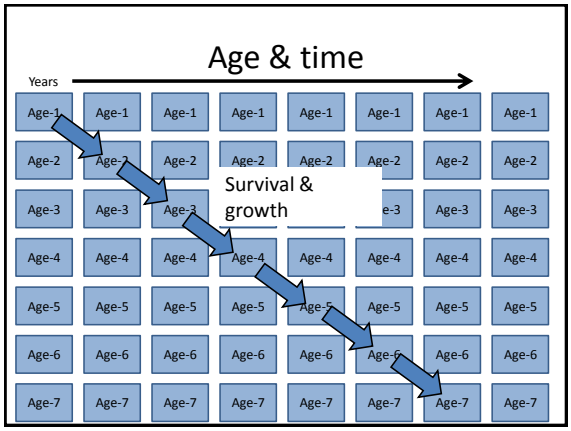


Age-weight



Age & time




Age & time
Years
Age-1
Age-2
Age-3
Age-4
Age-5
Age-6
Age-7
Survival &
growth