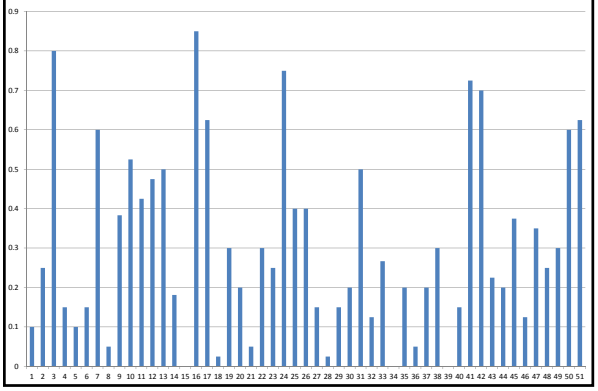
WF4313/6613-Fisheries Management

Class 13– Yield Management & Management Case Study

Exam 1



Announcements

Class Topics

Yield and biomass management
Management case study

Announcement

1. Lab tomorrow 10/3-Stream electrofishing
2. Waders, bug repellent, sunscreen, water

10/3-Group 1	10/10-Group 2
Yasko, S	McAllister, B.
Rush, H	Cook, M.
Gerhart, B.	Pigott, W.
Yarber, C.	Thompson, W.
Shannon, A.	Lucore, A.
Wilson, A.	Virden, M.
Lundy, F.	Hopson, E.
Woodyard, E.	Pettigrew, C.
Munter, Z.	Roberson, H.
Tipton, J.	Gammon, T.

Management objectives:
1. Maximize yield

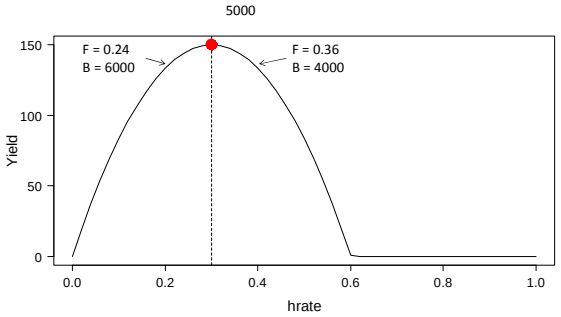
Unstructured & structured populations

HOW DO MANAGERS DETERMINE HOW MUCH TO HARVEST?

$$\frac{dB}{dt} = r \cdot B\frac{K-B}{K} - F \cdot B$$

BIOMASS: GRAHAM SCHAEFER

Equilibrium sustained yield



Concept: equilibrium & non-equilibrium

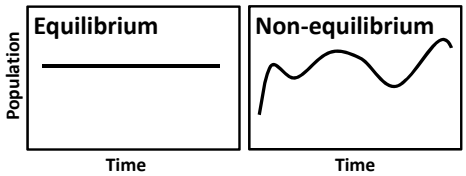
$0 = \frac{dBiomss}{dt}$ Population does not change over time.

$0 \neq \frac{dBiomss}{dt}$ Population is changing over time.

Why is this important?

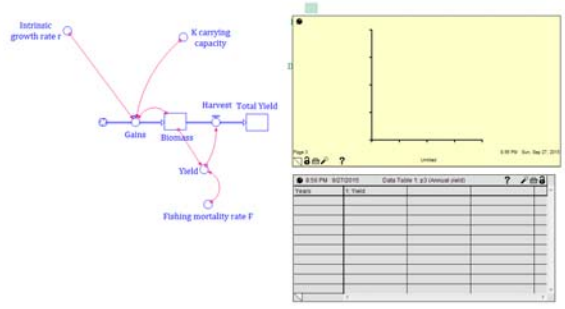
- Most harvest model evaluate equilibrium yield!
- Why? Lets explore this!

Concept: equilibrium & non-equilibrium

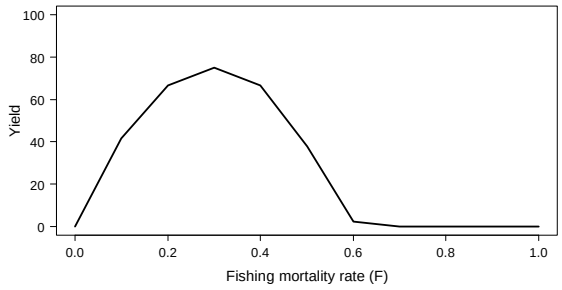


$0 = \frac{dBiomss}{dt}$ $0 \neq \frac{dBiomss}{dt}$

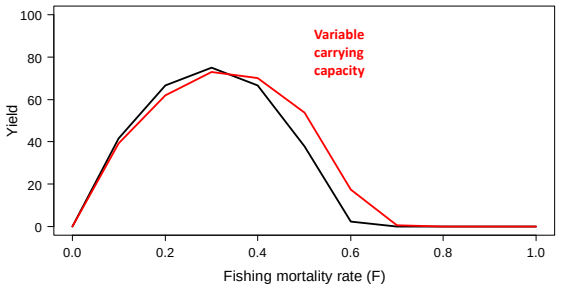
Biomass dynamics



Equilibrium conditions



Variation in carrying capacity

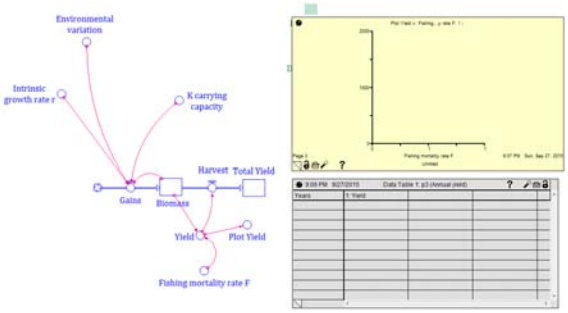


Biomass dynamics model assumptions

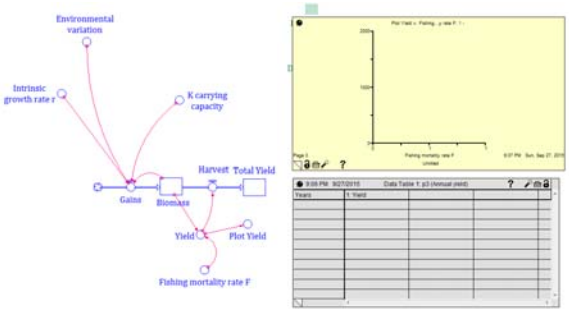
- Rates are constant
- Parameters are constant

Lets explore these

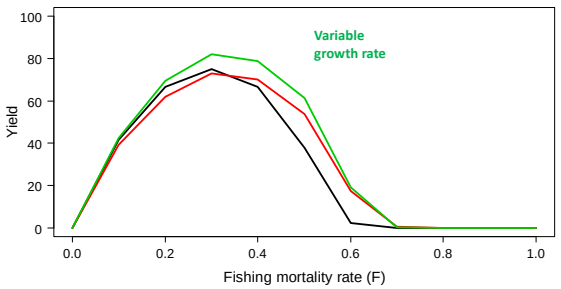
Varying intrinsic growth rates



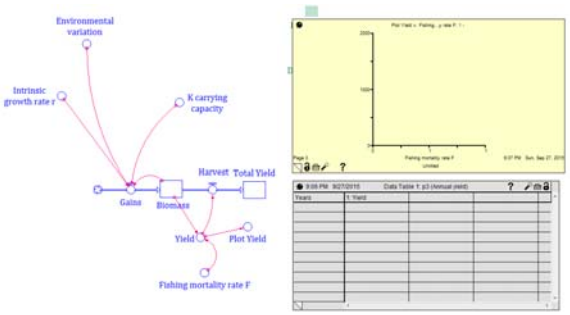
Varying carrying capacity



Variable r



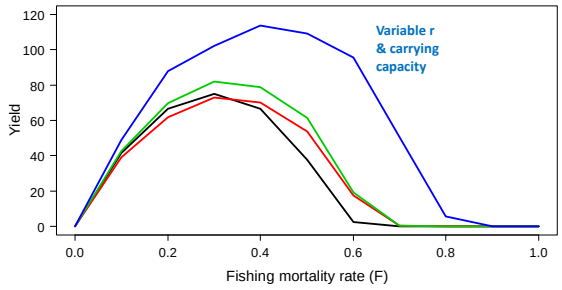
Variable K and r?



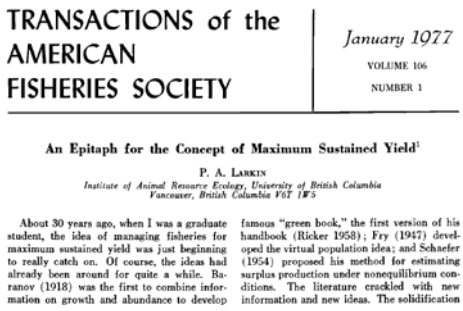
Dealing with these issues

- Precautionary approach
- Abandon MSY

Variable r and K



Epitaph for MSY



TRANSACTIONS of the AMERICAN FISHERIES SOCIETY

January 1977
VOLUME 106
NUMBER 1

An Epitaph for the Concept of Maximum Sustained Yield[1]

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About 30 years ago, when I was a graduate student, the idea of managing fisheries for maximum sustained yield was just beginning to really catch on. Of course, the ideas had already been around for quite a while. Baranov (1918) was the first to combine information on growth and abundance to develop famous "green book," the first version of his handbook (Ricker 1958); Fry (1947) developed the virtual population idea; and Schaefer (1954) proposed his method for estimating surplus production under nonequilibrium conditions. The literature crackled with new information and new ideas. The solidification

Managing biomass yield of aquatic resources is not easy!

$F_{0.1}$

The use of $F_{0.1}$ has emerged as a useful "rule of thumb" for managing fisheries, but according to Hilborn and Walters (1992) this is an arbitrary, ad hoc strategy with no theoretical basis.

How do we figure out $F_{0.1}$

1. Find slope at origin
2. Plot line with 10% of this slope
3. Find tangent of curve at this slope

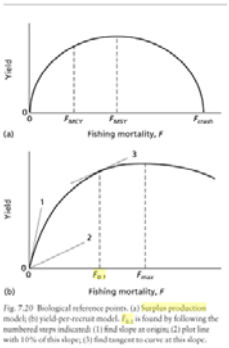
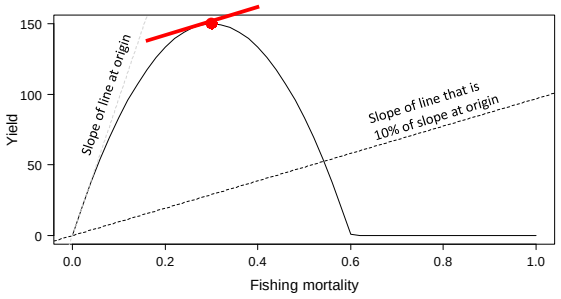
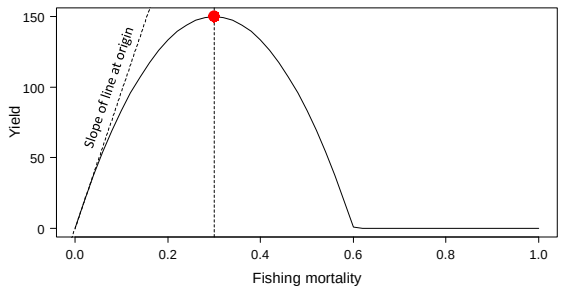


Fig. 7.20 Biological reference points. (a) Surplus production model; (b) yield-per-recruit model. $F_{0.1}$ is found by following the numbered steps indicated: (1) find slope at origin; (2) plot line with 10% of this slope; (3) find tangent to curve at this slope.

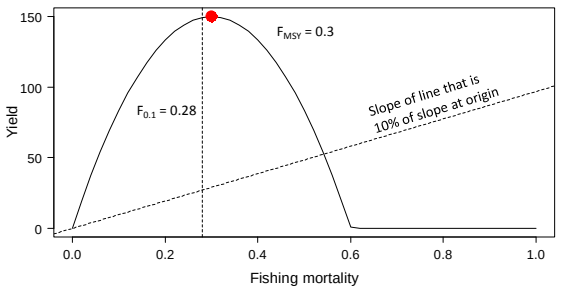
10% of slope at origin



Slope at origin



$F_{0.1}$



10% of slope at origin