

HW 5

1. Hastings Problems 8.1, 8.3, 8.4

8.1

8.1 Prey $\frac{dH}{dt} = rH - bHP$
 Predator $\frac{dP}{dt} = cHP - kP$

(a) modified
 Prey $\frac{dH}{dt} = rH - bHnP$ (where n is # of predators)
 Predator $\frac{dP}{dt} = cHnP - kP$

(b) Isoclines
 $\frac{dH}{dt} = 0 = rH - bHnP$
 $bHnP = rH$
 $P = \frac{rH}{bnH} = \frac{r}{bn}$
 $P = \frac{r}{bn}$

(c) $\frac{dP}{dt} = 0 = cHnP - kP$
 $kP = cHnP$
 $H = \frac{kP}{cP} = \frac{k}{c}$

(d)

(e) $\begin{bmatrix} \frac{dH}{dt} & \frac{dP}{dt} \\ \frac{dH}{dt} & \frac{dP}{dt} \end{bmatrix} (H, P) = \begin{bmatrix} 0 & \frac{r}{bn} \\ \frac{k}{c} & 0 \end{bmatrix}$

$\frac{dF}{dH} = rH - bHn(\frac{r}{bn}) = rH - \frac{bHnr}{bn} = rH - rH = 0$
 $\frac{dF}{dP} = r(\frac{k}{c}) - b(\frac{k}{c})nP = \frac{rk}{c} - \frac{bnk}{c}P$
 $\frac{bnk}{c}P = \frac{rk}{c} \Rightarrow P = \frac{rk}{bnk} = \frac{r}{bn}$

$\frac{dG}{dH} = cHn(\frac{r}{bn}) - knP = \frac{cHnr}{bn} - \frac{knr}{bn}$
 $\frac{cHnr}{bn} = \frac{knr}{bn} \Rightarrow H = \frac{k}{c}$
 $\frac{dG}{dP} = c(\frac{k}{c})nP - knP = knP - knP = 0$

Trace = 0 Determinant = (-) Unstable

8.3 and 8.4

8.3

$$\text{Prey } \frac{dH}{dt} = rH \left[1 - \frac{H}{K} \right] - bHP - d$$

$$\text{Predator } \frac{dP}{dt} = cHP - kP - d$$

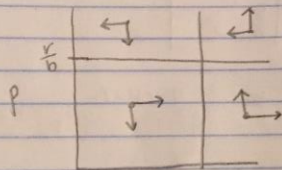
The d term would act as the death rate caused by the pesticide and would increase the death rate of the prey by acting like there were more predators and would increase the per capita death rate of the predator as well. If d more severely impacted $\frac{dP}{dt}$ then P would decrease and that could explain the increase in pests seen on the crops.

8.4

$$\text{Prey } \frac{dH}{dt} = r(H-h) - b(H-h)P \quad \text{safe prey}$$

$$\text{Predator } \frac{dP}{dt} = c(H-h)P - kP$$

If $H-h = H'$ then the equations are functionally the same



$H' = \frac{K}{b}$ ← this $H' = \frac{K}{b}$ would be less than $H = \frac{K}{b}$ since some of the prey are safe

Refuges can protect prey and maintain a smaller predator size which may bring the community closer to equilibrium

2. [Complete this wiki training](#). Include screenshots in your HW to demonstrate you completed the training.

population-ecology-2016/... W Wikipedia:Training/For stu... +

https://en.wikipedia.org/wiki/Wikipedia:Training/For_students/Let's_begin

Project page **Talk** Read **Edit** View history Search

Wikipedia:Training/For students/Let's begin

From Wikipedia, the free encyclopedia
< Wikipedia:Training | For students

Wikipedia Training **Welcome** Menu Resources Page 4 of 4

Let's begin...

We hope the material found in this orientation will provide you with practical information to help you get started on Wikipedia. We also hope that this will help you find your own place in the Wikipedia community. This is the encyclopedia that anyone can edit, and the way it gets better is from people like you editing to improve it.

Important!

When you complete all modules of the training, we'll ask you to push a few buttons and (optionally) leave some brief feedback for us, using your Wikipedia

WIKIPEDIA
The Free Encyclopedia

Main page
Contents
Featured content
Current events
Random article
Donate to Wikipedia
Wikipedia store

Interaction
Help
About Wikipedia
Community portal
Recent changes
Contact page

Tools
What links here
Related changes
Upload file
Special pages
Permanent link
Page information
Wikidata item

Print/export
Create a book

7:21 PM
5/11/2016

population-ecology-2016/... W Wikipedia:Training/For stu... +

https://en.wikipedia.org/wiki/Wikipedia:Training/For_students/Module_2_complete

Project page **Talk** Read **Edit** View history Search

Wikipedia:Training/For students/Module 2 complete

From Wikipedia, the free encyclopedia
< Wikipedia:Training | For students

Wikipedia Training **The Core** Menu Resources

Wikipedia Training: Module 2 complete!

- ✓ Module 1: Welcome and Introductions
- ✓ Module 2: The Core of Wikipedia
- Module 3: Editing Basics
- Module 4: Advanced Editing

Click on the forward arrow to go on to learn about Editing Wikipedia.

← →

WIKIPEDIA
The Free Encyclopedia

Main page
Contents
Featured content
Current events
Random article
Donate to Wikipedia
Wikipedia store

Interaction
Help
About Wikipedia
Community portal
Recent changes
Contact page

Tools
What links here
Related changes
Upload file
Special pages
Permanent link
Page information
Wikidata item

Print/export
Create a book

7:29 PM
5/11/2016

population-ecology-2016/... W Wikipedia:Training/For stu... +

https://en.wikipedia.org/wiki/Wikipedia:Training/For_students/Module_3_complete

Project page Talk Read Edit View history Search

Wikipedia:Training/For students/Module 3 complete

From Wikipedia, the free encyclopedia
< Wikipedia:Training | For students

Wikipedia Training Editing Menu Resources

Wikipedia Training: Module 3 complete!

- ✓ Module 1: Welcome and Introductions
- ✓ Module 2: The core of Wikipedia
- ✓ Module 3: Editing Basics
- Module 4: Advanced Editing

Click on the forward arrow to continue on to the last module.

← →

WIKIPEDIA The Free Encyclopedia

Main page
Contents
Featured content
Current events
Random article
Donate to Wikipedia
Wikipedia store

Interaction
Help
About Wikipedia
Community portal
Recent changes
Contact page

Tools
What links here
Related changes
Upload file
Special pages
Permanent link
Page information
Wikidata item

Print/export
Create a book

7:37 PM 5/11/2016

population-ecology-2016/... W Wikipedia:Training/For stu... +

https://en.wikipedia.org/wiki/Wikipedia:Training/For_students/Choosing_articles_3

Wikipedia:Training/For students/Choosing articles 3

From Wikipedia, the free encyclopedia
< Wikipedia:Training | For students

Wikipedia Training Advanced Menu Resources Page 4 of 13

Choosing articles

Good choice

- Choose a topic that is well established in its field, but only weakly represented on Wikipedia. The best choice is a topic for which a lot of literature is available but which isn't covered extensively on Wikipedia.
- Gravitate toward "stub" and "start" class articles. These articles often have only 1-2 paragraphs of information and are in need of expansion. You can see an article's rating by visiting its talk page, and relevant WikiProject pages can provide a list of stubs that need improvement.
- Before creating a new article, do an in-depth search of related topics on Wikipedia to make sure your topic isn't already covered. Often, an article may already exist under another name, or the topic may be covered as a subsection of a broader article.

WIKIPEDIA The Free Encyclopedia

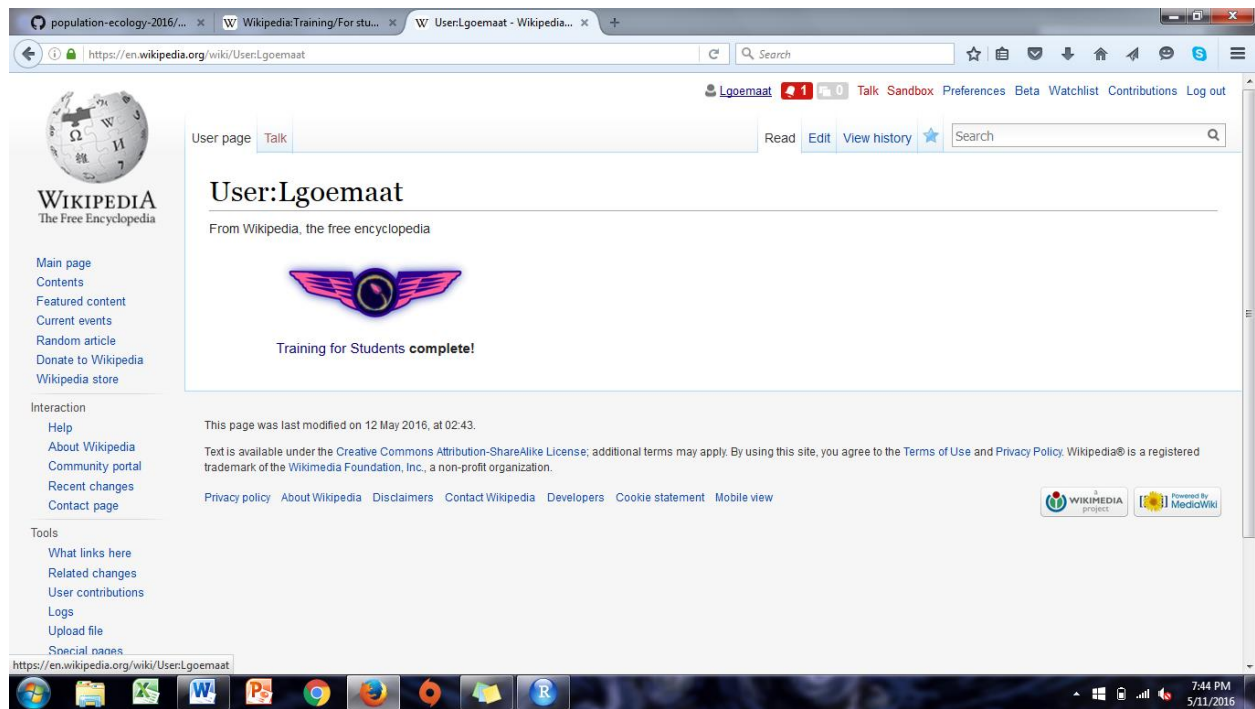
Main page
Contents
Featured content
Current events
Random article
Donate to Wikipedia
Wikipedia store

Interaction
Help
About Wikipedia
Community portal
Recent changes
Contact page

Tools
What links here
Related changes
Upload file
Special pages
Permanent link
Page information
Wikidata item

Print/export
Create a book
Download as PDF
Printable version

7:40 PM 5/11/2016



3. [Check out this draft document before class.](#)

I checked out the document describing our Wiki-a-thon event!