Python for Ecologists

- Assuming not much programming experience
- Immersion approach
 - Short lecture on Python topic
 - Hands-on Python exercises
 - Rinse & repeat
- Will use ecological examples as much as possible

Your presenters

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Why bother with Python when I have R?

- A scripting language (like R) but also,
- A high level programming language
- Designed to produce readable code
- Cross-platform

übertool Python project

- http://www.ubertool.org
- Created with Python as the science engine
- Integrates easily with web technologies such as HTML, JavaScript, JQuery

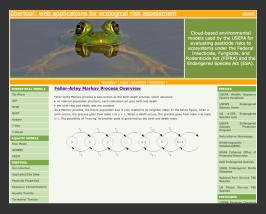


Figure: übertool ecological risk web application

Getting setup

- We will use Python 2.7 (not 3)
- http://www.python.org/getit/
- For Windows users: http://portablepython.com/wiki/Download

Some extra libraries to install

- numpy- http://sourceforge.net/projects/numpy/
- scipy- http://sourceforge.net/projects/scipy/files/

Need a text editor

- ▶ Linux-/
- Mac- TextWrangler, Smultron, TextEdit (already installed)
- Windows- Notepad (already installed), Notepad++,
 TextPad

Python IDLE IDE

- http://www.ubertool.org
- Created with Python as the science engine

Python objects

- Everything in Python is an object with these properties
 - an identity (id)
 - a type (type)
 - a value (mutable or immutable)

Each Python object has an id

```
>>> n_predators = 12
>>> id(n_predators)
4298191056
```

Each Python object has a type

```
>>> n_predators = 12
>>> type(n_predators)
<type 'int'>
```

Each Python object has a value

String, integer, and tuple object values are immutable

```
>>> n_prey = 88

>>> id(n_prey)

4298193184

>>> n_prey = 96

>>> id(n_prey)

4298192992 # id for n_prey has changed
```

Dictionary and list items are mutable

```
>>> birds = ["cardinal", "oriole"]
>>> id(birds)
4332756000
>>> birds.append("gnatcatcher")
>>> id(birds)
4332756000 # id is still the same
```

Variables

```
pop_size = 112 # integer
pop_density2 = 4 # still an integer
pop_density = 4. # float
species_name = "Oedipina_complex" # string
species_name = "4" # still a string
```

Python variable naming conventions

- all lowercase
- cannot start with numbers
- separate_words_with_underscores
- Style Guide for Python:
 - http://www.python.org/dev/peps/pep-0008/

Exercise 1

variables.py

Hello world! (from an interpreter)

```
>>> python
>>> print "Hello_world!"
Hello world!
```

Hello world! (from a script)

```
# save this in a text file as hello.py
print "Hello_world!"
# then run at the command prompt with 'python hello.py'
```

Hello world! (as an executable)

```
#!/usr/bin/env python
# the above line automatically invokes Python
# save this in a text file as hello_exe.py
print "Hello_world!"
# we can run this with simply "hello"
```