A PREDATOR-PREY MODEL FOR LARGEMOUTH BASS AND CHANNEL CATFISH

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IMPORTANCE

Over 7,000 lakes, and 800,000 private ponds in Texas.

Bass and Catfish are most popular/common sport fish.

Model could be used to estimate fish population, without using test instruments.

If healthy populations are maintained, lakes and pond managers could save thousands of dollars

ASSUMPTIONS

- Similar sizes of each fish.
- Constant water level.
- ½ Acre Pond ~ 15 ft deep.
- Ample amount of Insects.
- No predators.
- Natural Mortality is included.
- Quality of Water is adequate.

VARIABLES

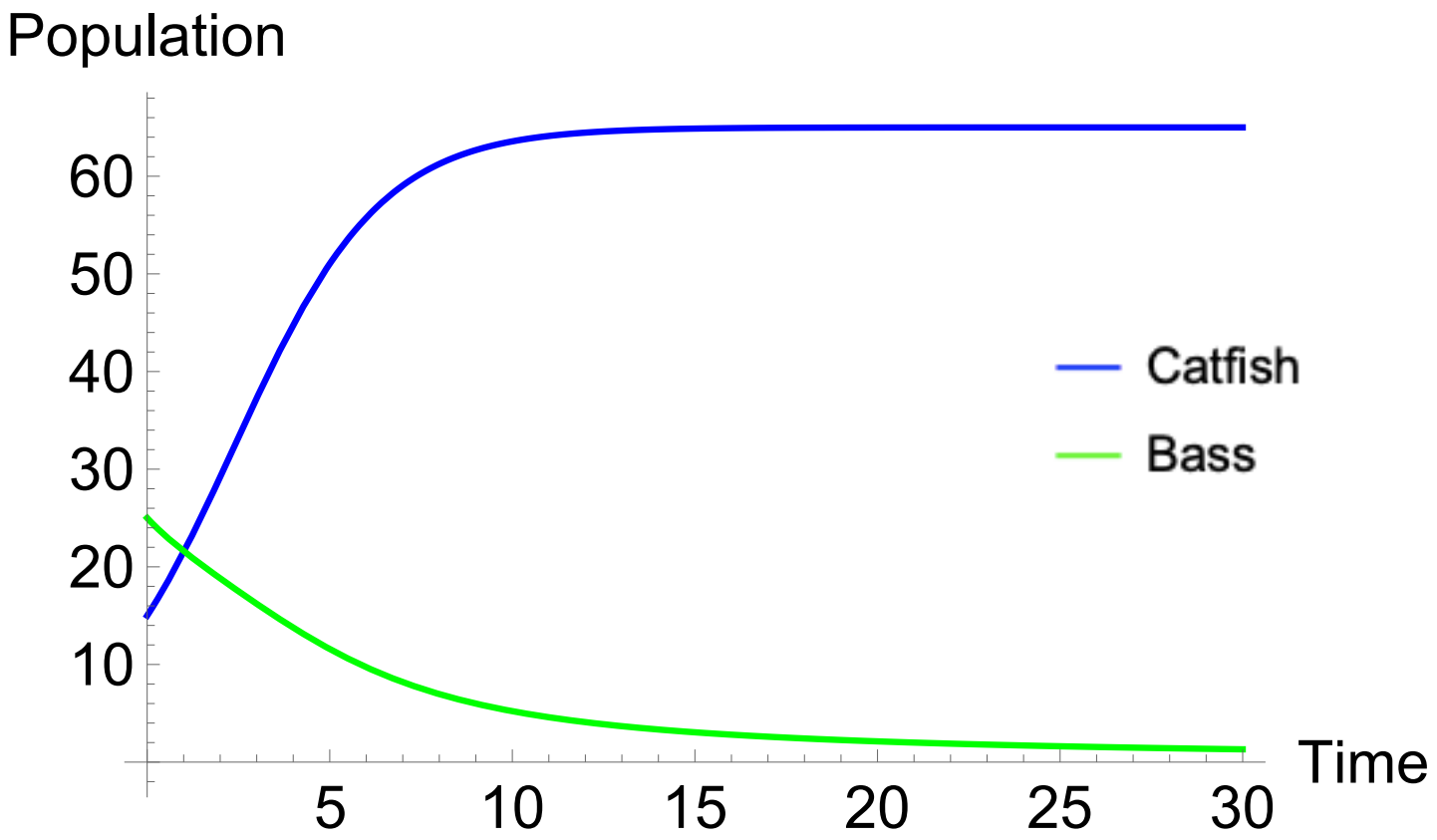
Variable	Description	Parameter
g_i	Annual growth of fish	≈ .7lbs Bass ≈ .5lbs Catfish
k_i	Carrying capacity ~ Biomass	≈ 25lbs Bass ≈ 65lbs Catfish
f_i	Competition Factor	

Lotka-Volterra Equations

$$Catfish' = Cg_c\left(1 - \frac{C}{k_c}\right) - f_cCB$$

$$Bass' = Bg_b\left(1 - \frac{B}{k_b}\right) - f_bCB$$

CATFISH WIN



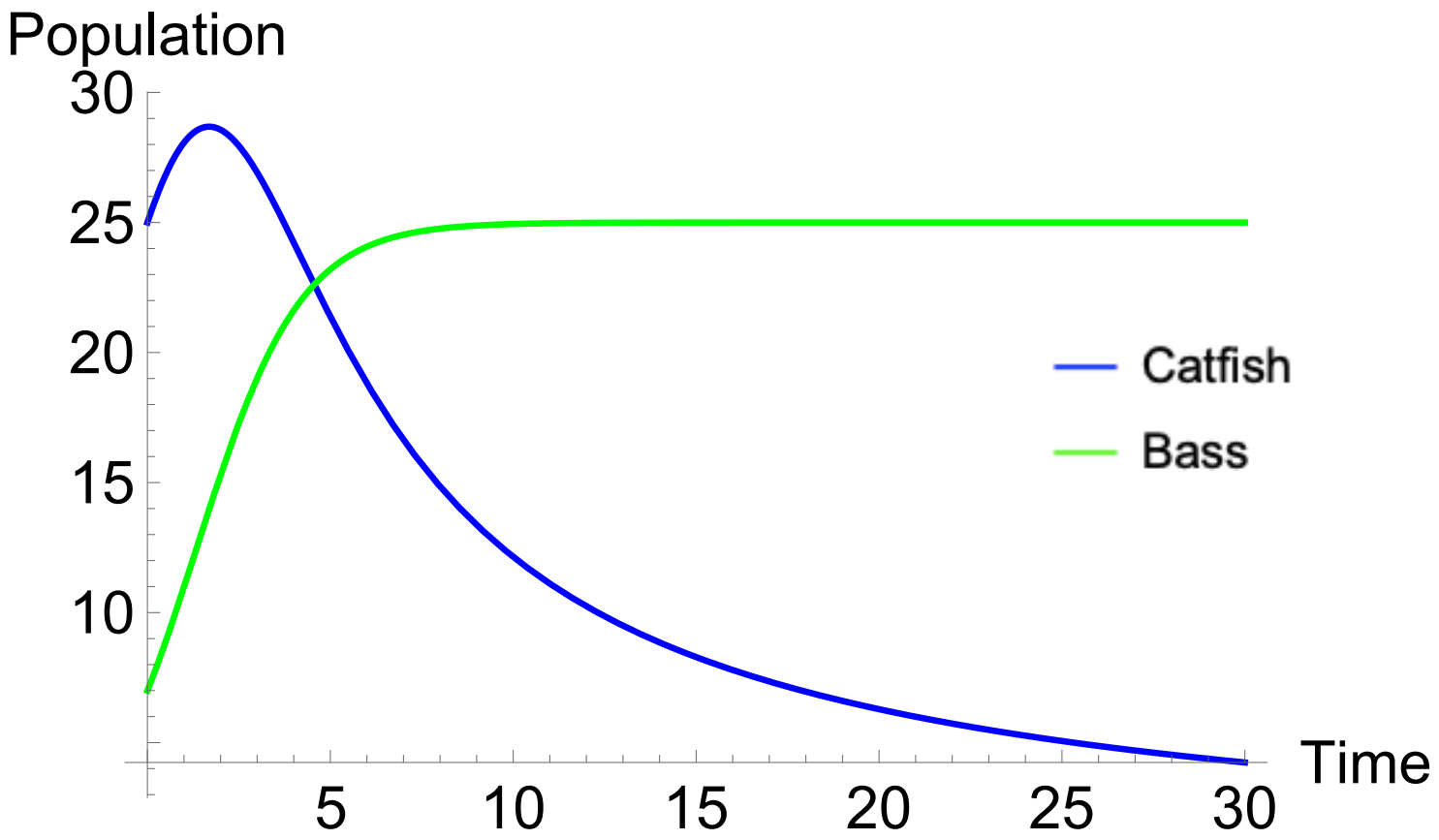
Conditions

$$Competiton_b > \frac{Growth_b}{Carrying_c}$$

Equilibrium

$$(C \to 65\ lbs, B \to 0)$$

BASS WIN



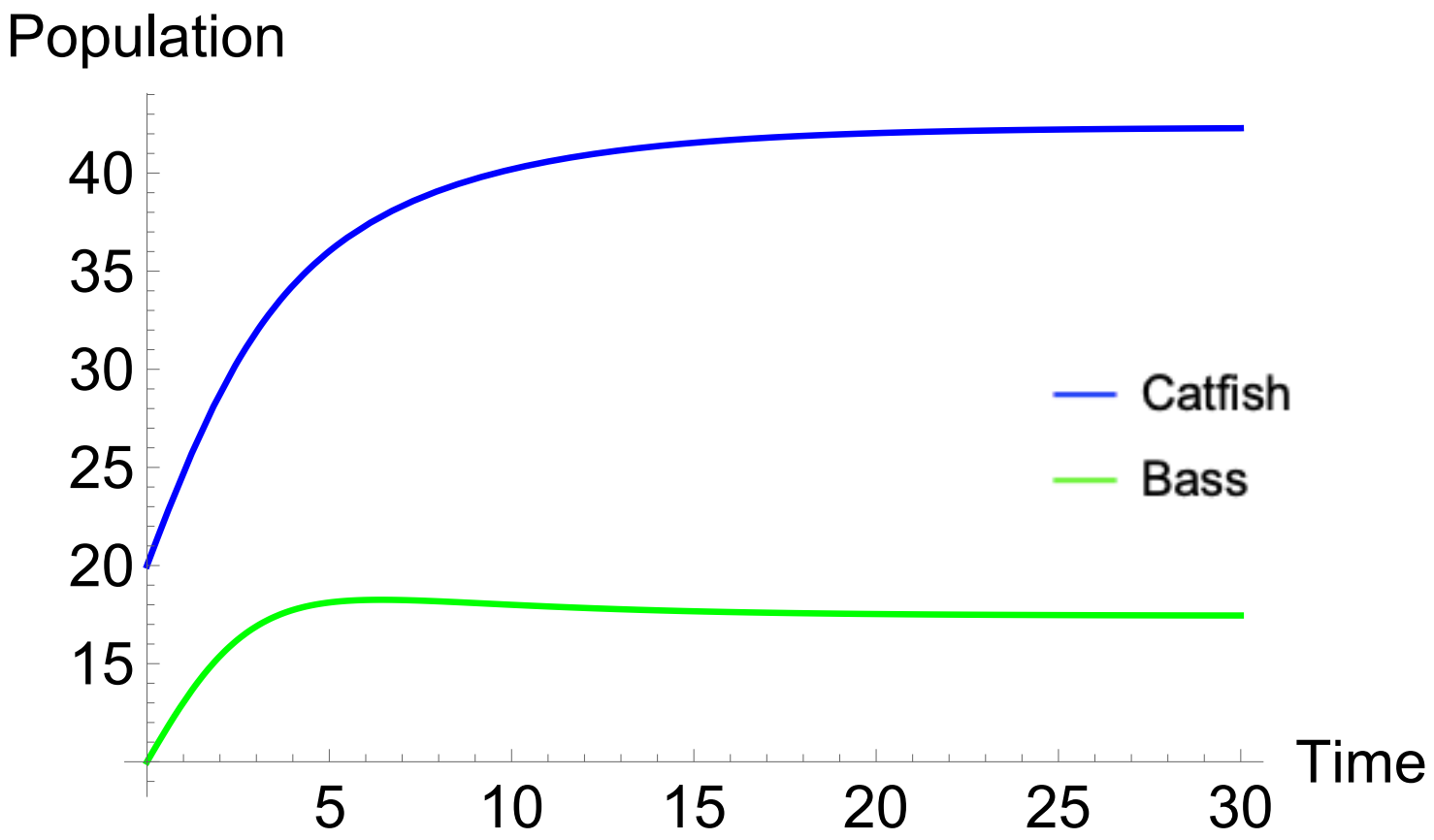
Conditions

$$Competiton_c > \frac{Growth_c}{Carrying_b}$$

Equilibrium

$$(C \to 0\ lbs, B \to 25\ lbs)$$

CO-EXISTENCE



Conditions

$$0 < Competition_b \leq \frac{Growth_C}{Carrying_C}$$

$$\& \; 0 < Competition_c < \frac{Growth_b}{Carrying_b}$$

Equilibrium

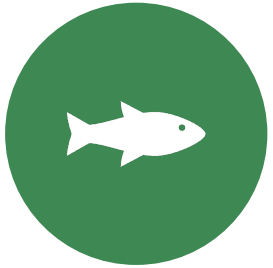
$$(C \rightarrow 42.35\ lbs, B \rightarrow 17.44 lbs)$$

IMPROVEMENTS/FUTURE WORKS

WATER LEVEL

HARVESTING RATE

FEEDING BENEFITS



EXPANDED TO LAKES

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