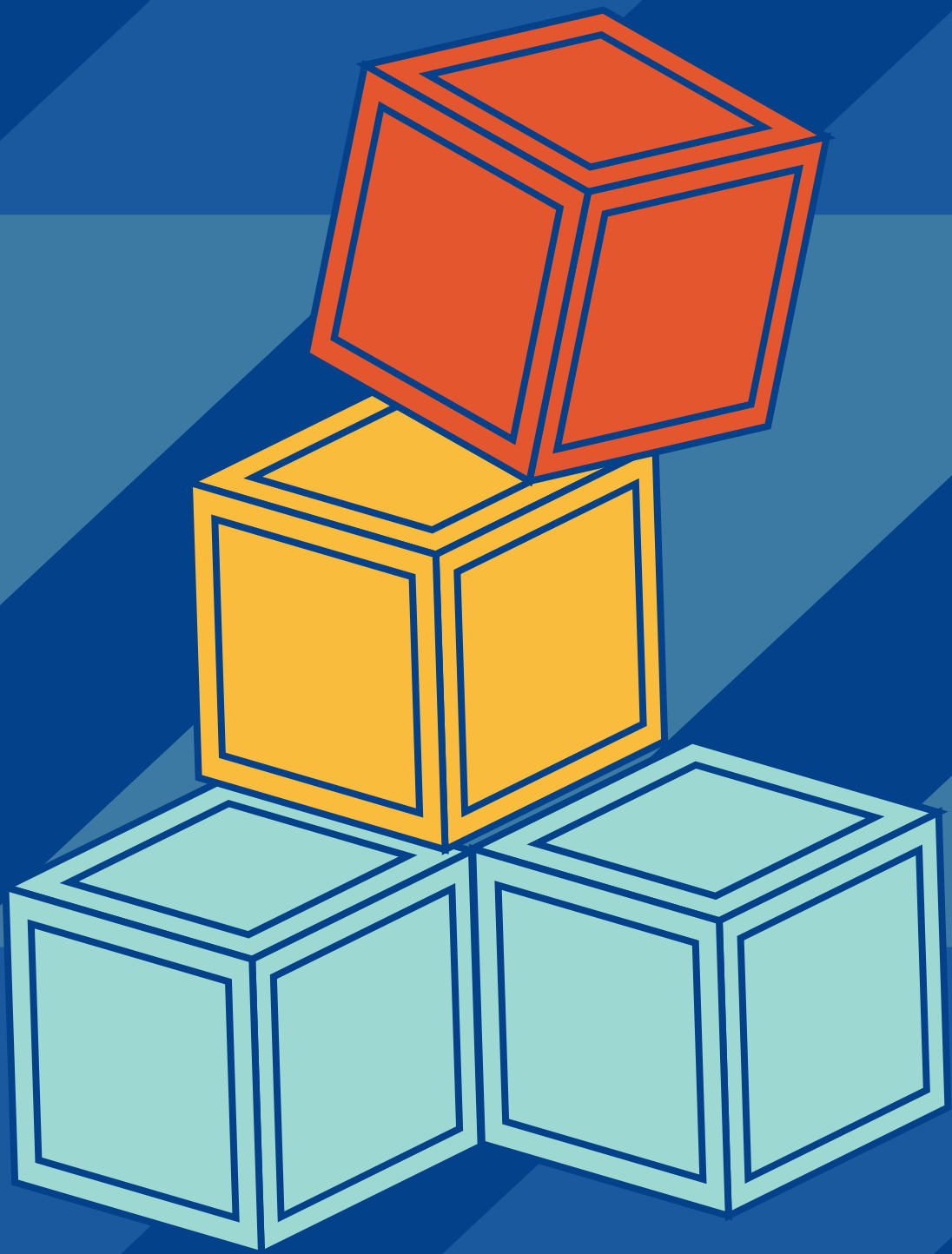


ECCO STAX

Climate Change Stacking Game



CAN YOUR ECOSYSTEM
HANDLE THE PRESSURE?



NCSE
National Center for
Science Education

MAMMALIAN SHIFT



Climate change causes small mammals to seek out higher elevations, causing a change in distribution.

Move **2 secondary consumers** from the southern most area to the northern most area in in your ecosystem.

Moritz et al. 2008

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BIRD INFLUX



Changing temperatures cause birds to breed earlier, resulting in altered species interactions and exhausted resources.

Remove 2 **primary consumers** from your ecosystem.

Walther et al. 2005

FISH DISTRIBUTION



Rising temperatures cause fish to move towards the poles, resulting in extinction of unfit groups.

Move **1 tertiary consumer** to the northern range of the species.

Perry et al. 2005

BUTTERFLY EXTINCTION



Increases in human activity causes species shifts and ultimately, extinction.

Remove 2 primary consumers from your ecosystem.

Parmesan & Matthews 1996

PLANT DISTRIBUTION



Climate change alters plant elevation and distributions, causing longer growing seasons, earlier flowering, and earlier harvest.

Remove **2 primary producers** from your ecosystem.

Kelly & Goulden 2008

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BUTTERFLY INFLUX



Butterflies start appearing earlier, but often cannot find food.

Add **2 secondary consumers** to your ecosystem.

Roy and Sparks, 2000

SPECIES INTERACTIONS



Temperature increases affect seasonal species interactions, organism fitness, and geographic range.

Remove **2 primary producers** from your ecosystem.

Gilman et al. 2010

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PLANT DISTRIBUTION



Warming climate shifts optimal monkey-flower ranges to higher elevations. Remove **2 primary producers** from the southern side of your ecosystem and add them to the northern side.

Angert and Schemske 2005

SPECIES INTERACTIONS



A mild rise in temperature increases starfish feeding rates, reducing mussel populations.

Add **1 secondary consumer** to your ecosystem.

Broitman et al. 2009

SPECIES INTERACTIONS



A rise in temperature is stressful enough to reduce starfish feeding rates, increasing mussel populations.

Add 2 primary consumers to your ecosystem.

Broitman et al. 2009

SPECIES DISTRIBUTION



Spiders move to higher latitudes in response to high levels of climate warming.

Remove **1 secondary consumer** from your ecosystem.

Chen et al. 2011

PLANT DISTRIBUTION



The pace of climate change exceeds the ability of trees to adapt to their new climates.

Remove **2 primary producers** from your ecosystem.

Davis and Shaw 2001

SPECIES INTERACTIONS



Species shifting upslope benefit from the increased area.

Add **1 primary producer** to your ecosystem.

Elsen and Tingley 2015

PREDATOR SHIFT



Foxes move northwards
and outcompete arctic
foxes.

Add **1 tertiary consumer**
to your ecosystem.

Hersteinsson & MacDonald 1992

KEY



Primary Producer



Primary Consumer



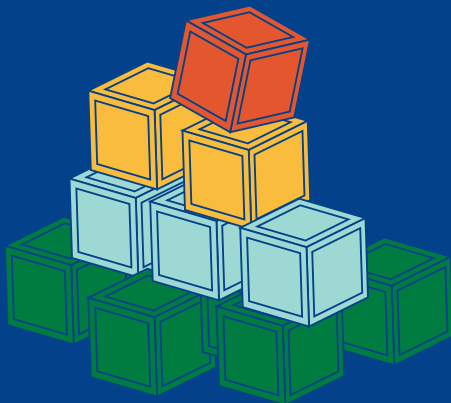
Secondary Consumer



Tertiary Consumer

ECO STAX

ECOYSYSTEM
CARDS



NORTH

SOUTH