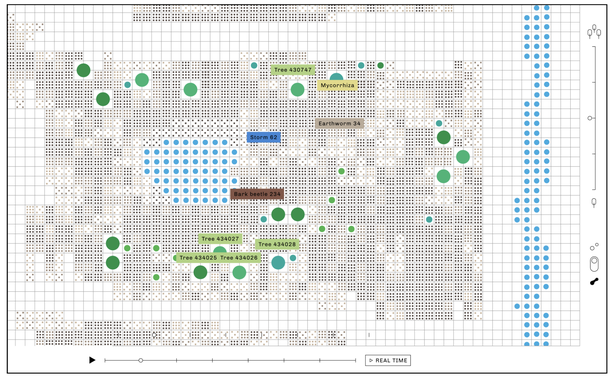
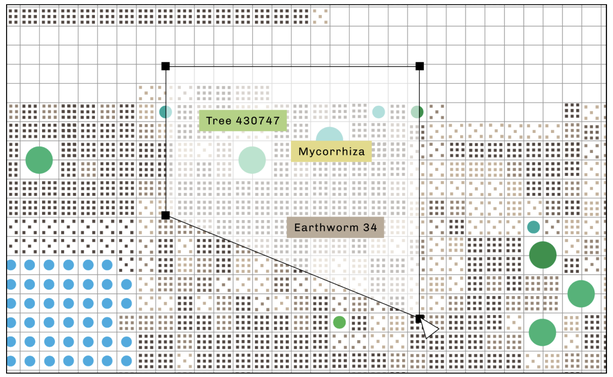
SCALING VIEWS

MACRO VIEW

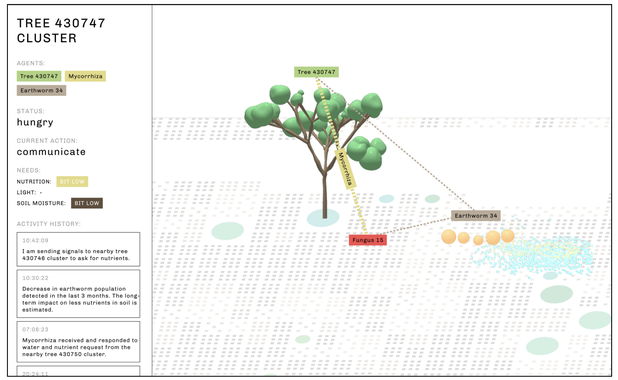


The user can observe the simulation result at the macro scale. This helps the user notice changes that manifest on large scales, such as population dynamics, migration, or succession.

MESO VIEW

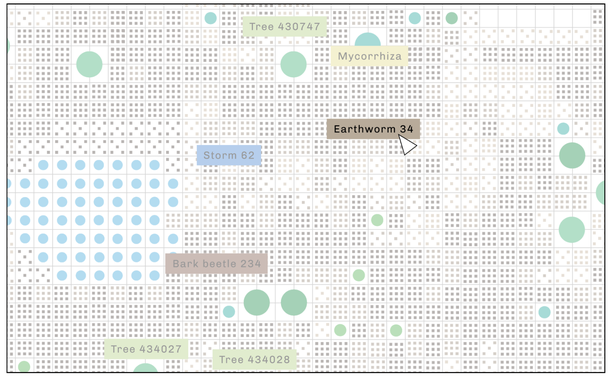


The user can draw the polygon to group entities. This grouped cluster is seen as a living community where each exists in balance and performs its own roles to sustain the survival of the community.

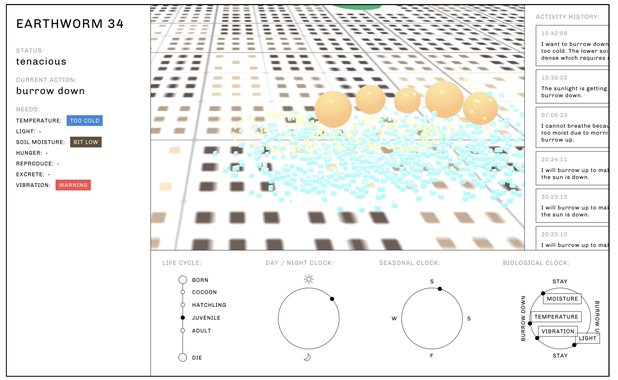


The user can observe the simulation result at the meso scale. This means that the future scenario is curated based on the status and interest of the group: for example, what comes as a threat or benefit to the group. The dash and weight of the links illustrate the balance within the cluster.

MICRO VIEW



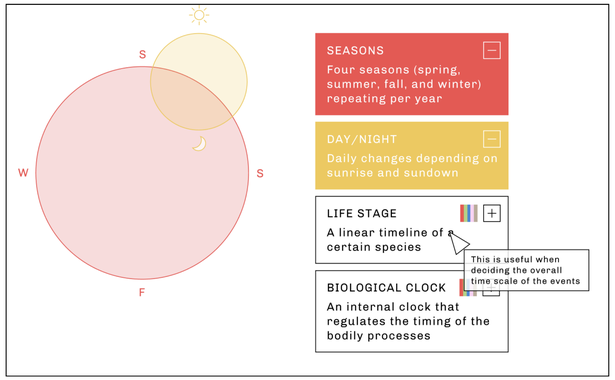
Each entity is labeled on the map. When clicked, it shows detailed information about the entity.



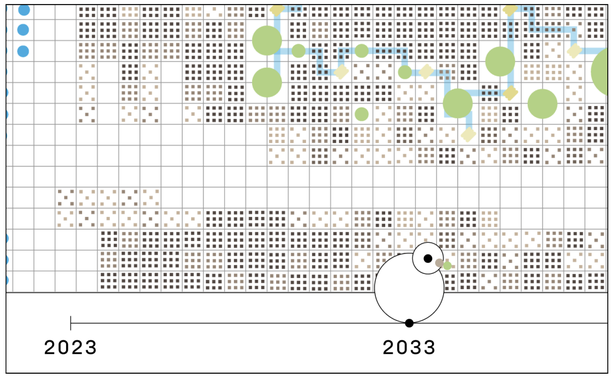
The micro view shows the information of a single species including its status, current action, needs, diverse clocks, spatiality, and activity history. In the main panel in the middle, real-time animation of the entity sprinkling data points is shown to explain the relation between the data points and its behaviors.

RECOMPOSING TIMELINE

CYCLICAL TIMELINES

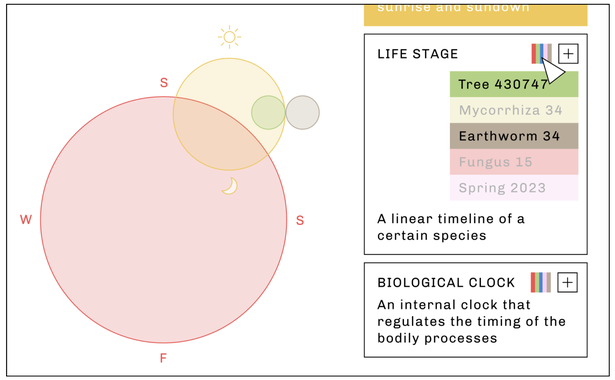


The user can design a timeline to curate the simulation results. Diverse seasonal rhythms or biological clocks can be selected and added.

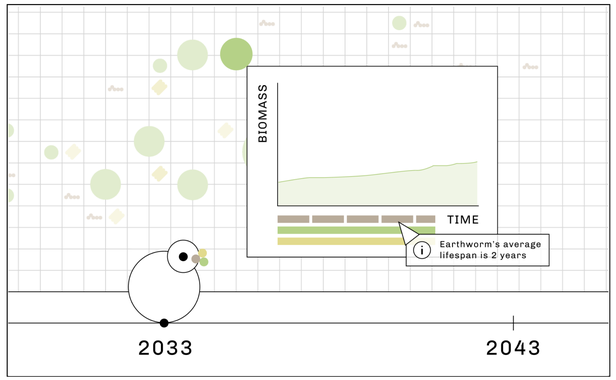


The customized timeline is shown as an icon in the time bar at the bottom of the macro view.

MULTISPECIES TIMELINE



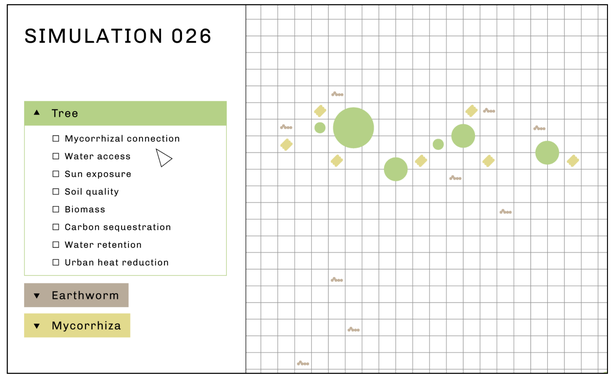
By selecting multiple species, the user can create a timeline consisting of diverse biological clocks or life stages of respective species.



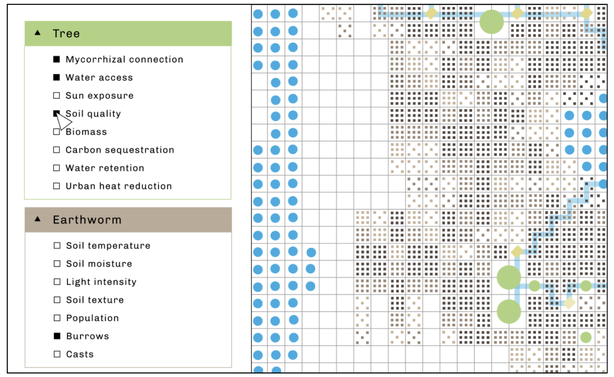
For example, instead of a numerical representation of time, the data is presented relative to the lifespan of each species. The colored bars on the time axis each represent the respective species' lifespan.

EXPLORING ENTANGLEMENTS

SELECT DATA

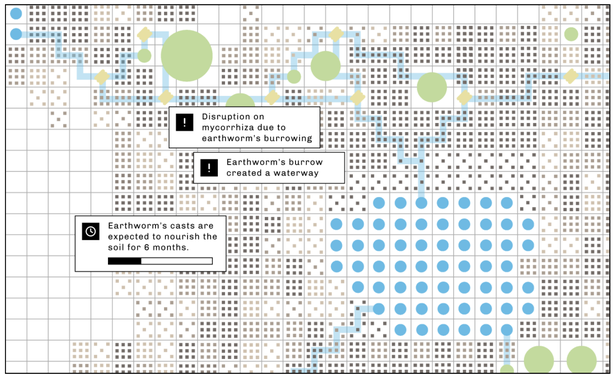


The user can select the types of information that they want to observe through simulations. The attributes of each agent are displayed in the drop-down menu.



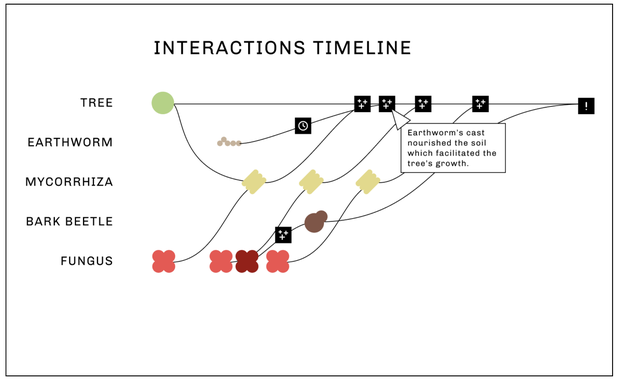
When multiple types of data are selected, they are shown in overlays.

INTERACTIONS MAPPING



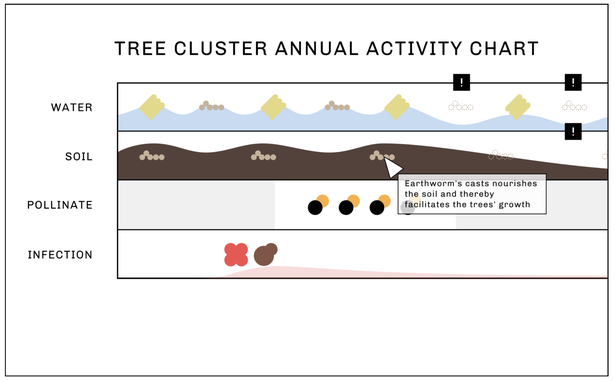
The events that arise from interactions are positioned on the map. The black box with each icon represent different types of events: for example, an exclamation mark signifying a warning, and a clock indicating the fixed-time impact.

INTERACTIONS TIMELINE

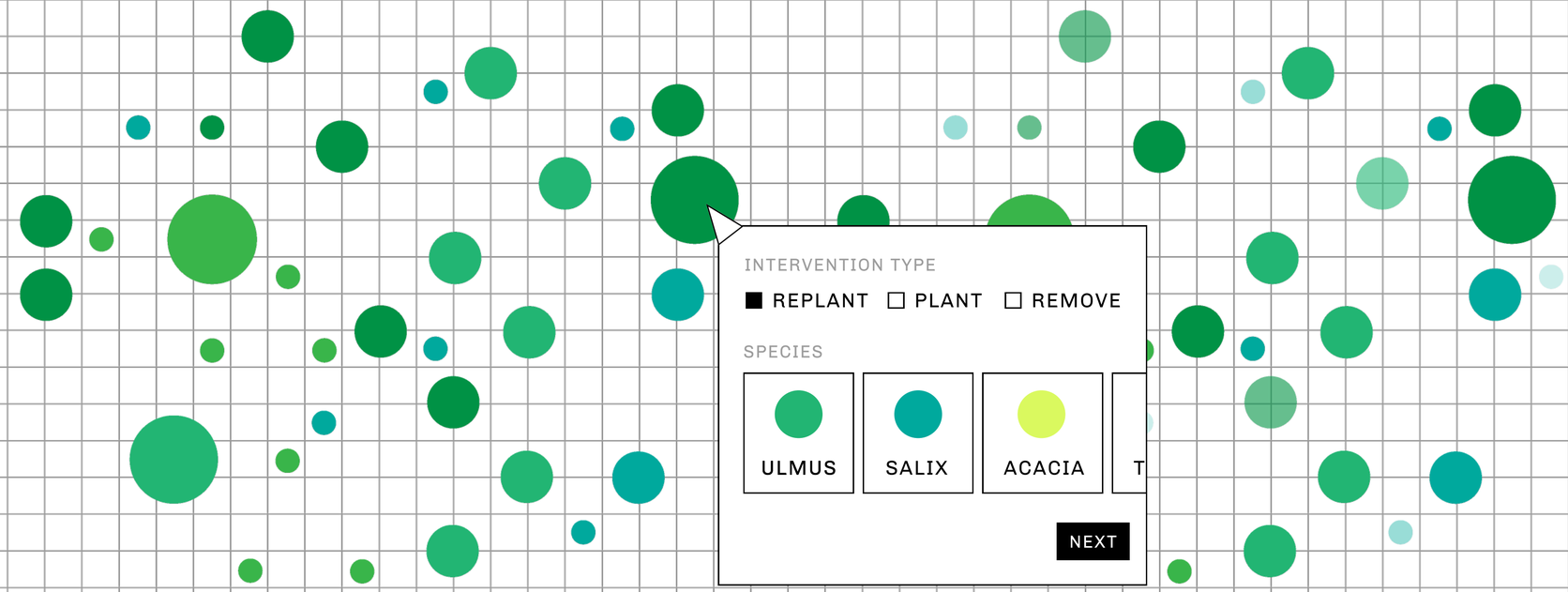


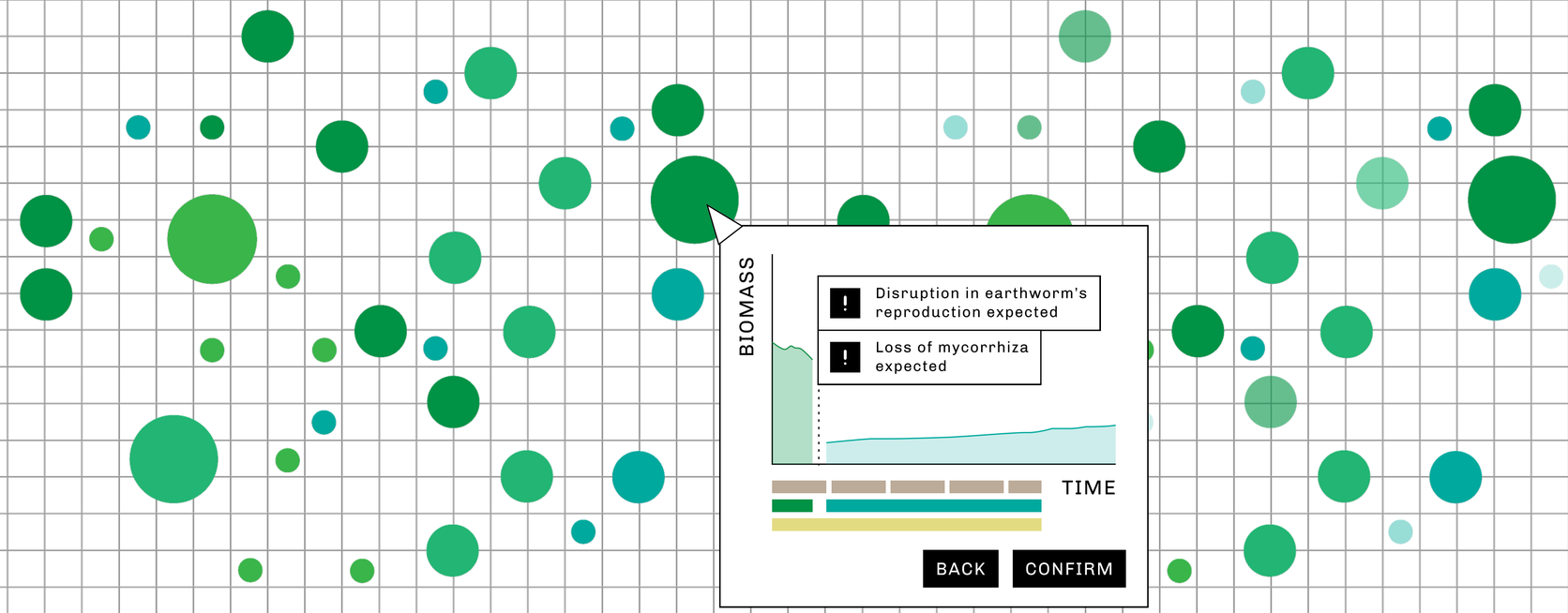
Interactions timeline highlights the interactions between two or more entities. The black box with each icon represents different types of events: for example, an exclamation mark signifying a warning, a clock indicating the fixed-time impact, and sparkles meaning mutually beneficial interactions.

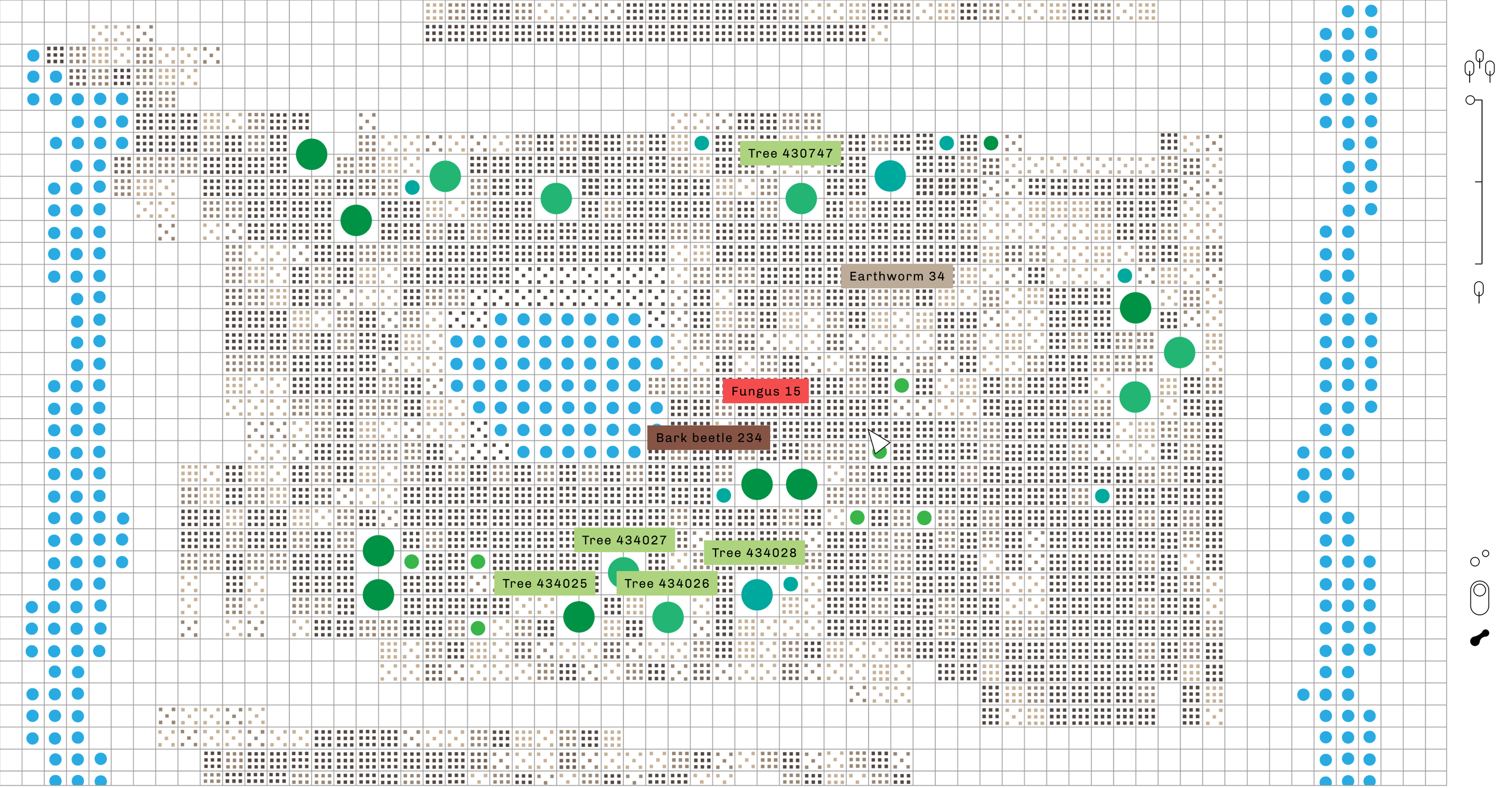
CLUSTER ACTIVITY CHART



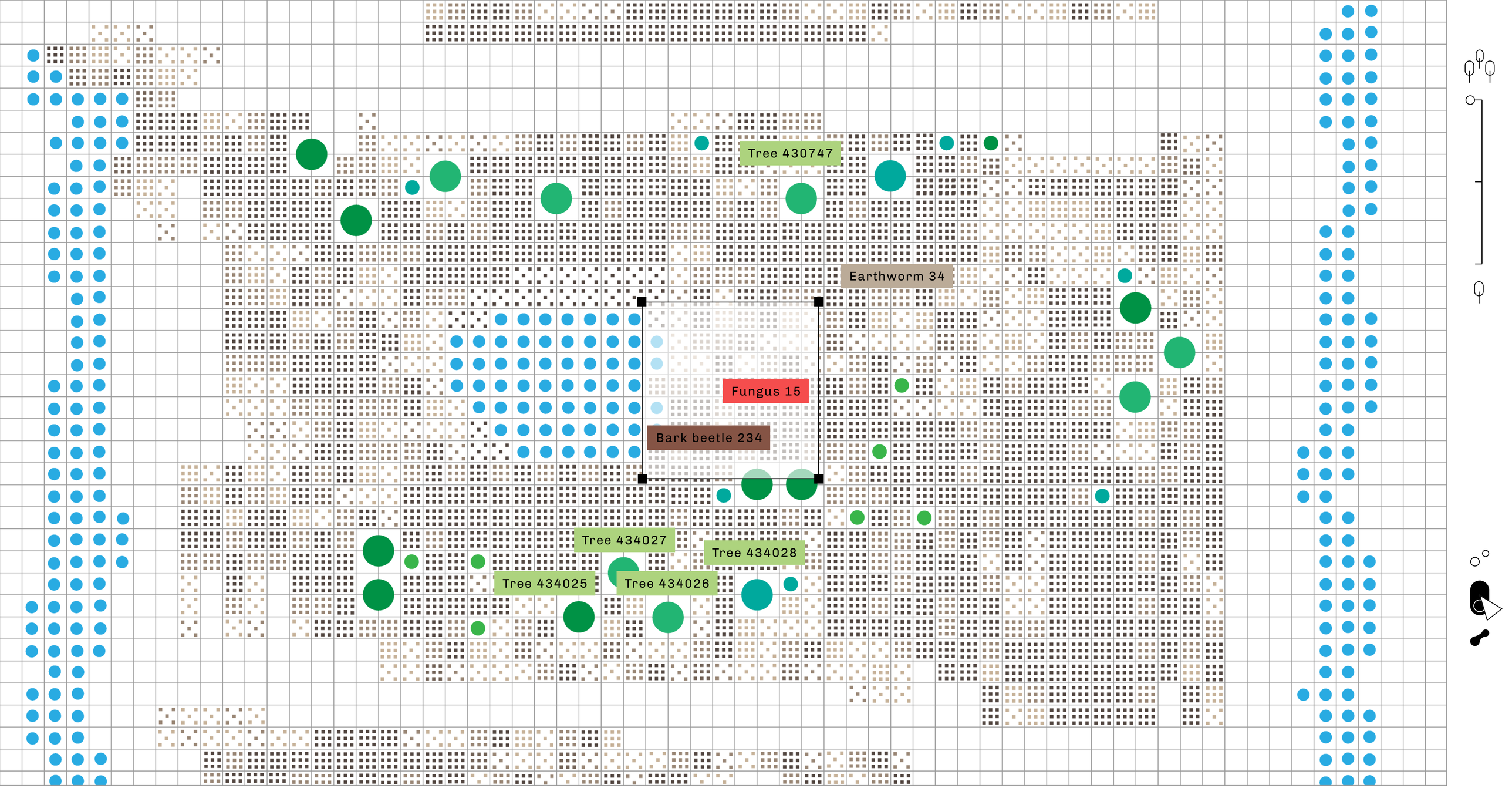
Cluster activity chart shows how its members contribute to the survival needs of the cluster. For example, the image above illustrates how different species are involved in providing water, nourishing soil, pollinating seeds, and infecting diseases.


INTERVENTION TYPE
REPLANT
PLANT
REMOVE
SPECIES
ULMUS
SALIX
ACACIA
T
NEXT

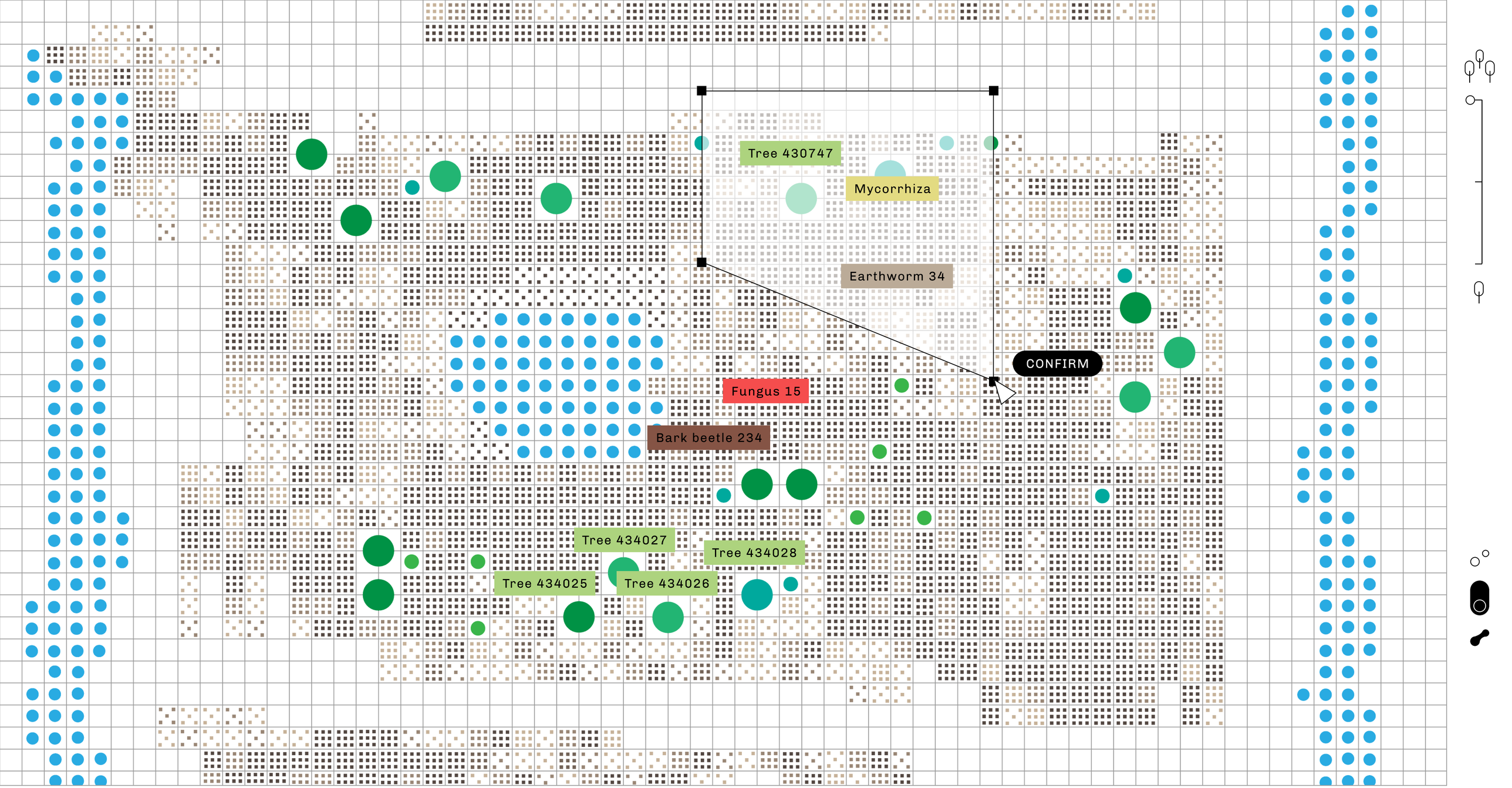

BIOMASS
Disruption in earthworm's reproduction expected
Loss of mycorrhiza expected
TIME
BACK
CONFIRM



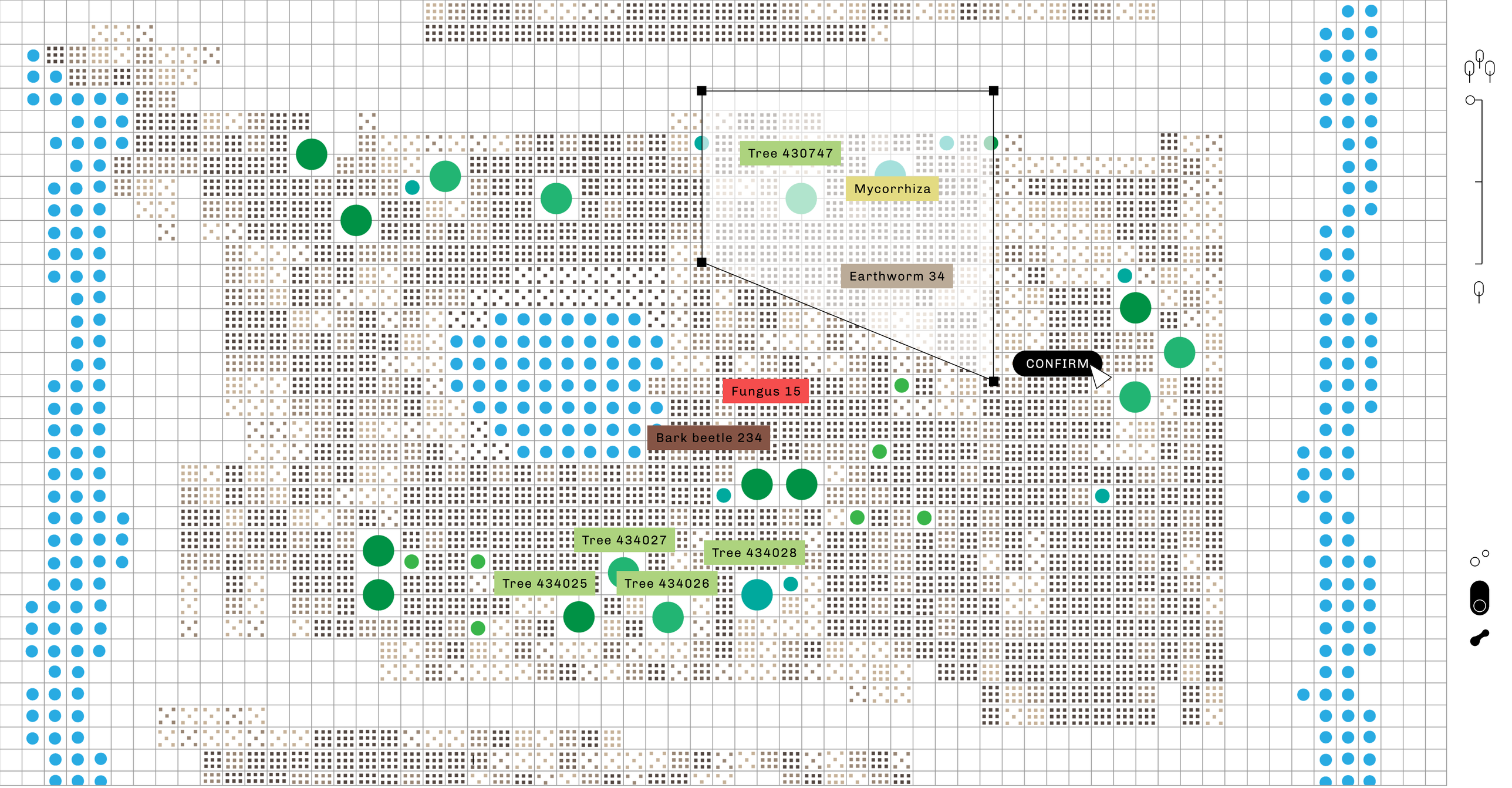
DESIGN TIMELINE



DESIGN TIMELINE



DESIGN TIMELINE



DESIGN TIMELINE

TREE 430747
CLUSTER

AGENTS:

Tree 430747 | Mycorrhiza | Earthworm 34

STATUS:

hungry

CURRENT ACTION:

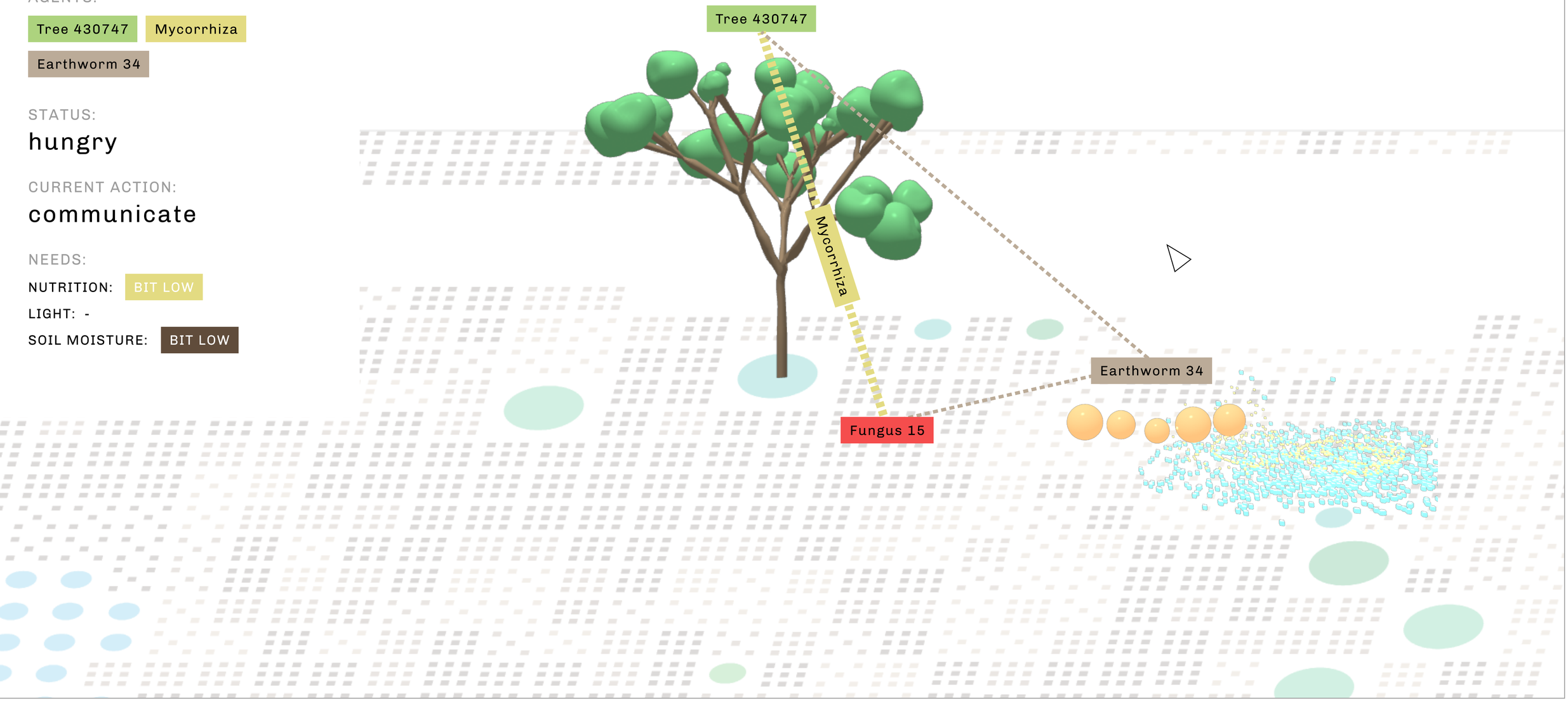
communicate

NEEDS:

NUTRITION: BIT LOW

LIGHT: -

SOIL MOISTURE: BIT LOW



DESIGN TIMELINE

TREE 430747 CLUSTER

AGENTS:

Tree 430747 | Mycorrhiza | Earthworm 34

STATUS:

hungry

CURRENT ACTION:

communicate

NEEDS:

NUTRITION: BIT LOW

LIGHT: -

SOIL MOISTURE: BIT LOW

ACTIVITY HISTORY:

10:42:09

I am sending signals to nearby tree 430746 cluster to ask for nutrients.

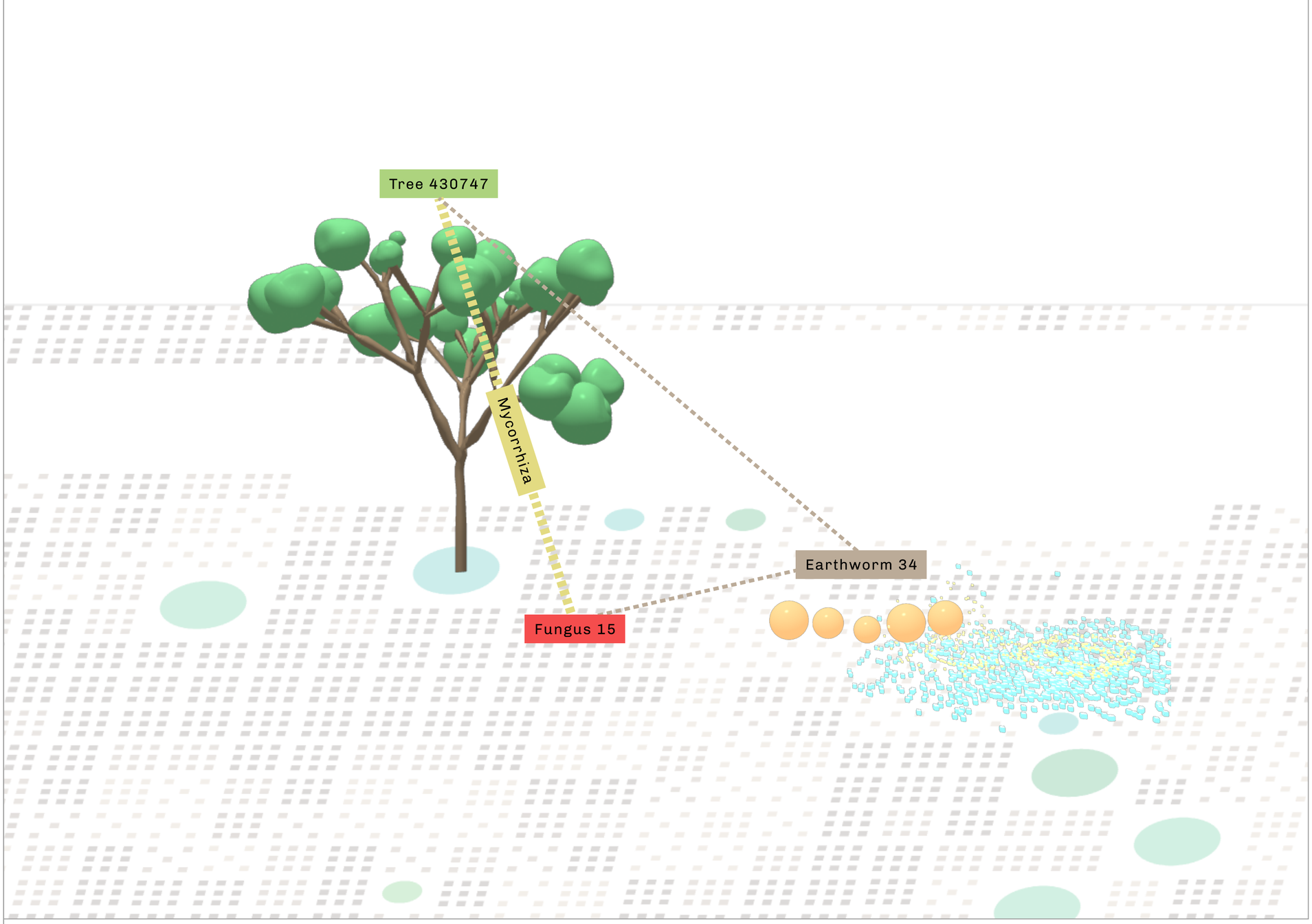
10:30:22

Decrease in earthworm population detected in the last 3 months. The long-term impact on less nutrients in soil is estimated.

07:06:23

Mycorrhiza received and responded to water and nutrient request from the nearby tree 430750 cluster.

20:24:11



DESIGN TIMELINE

TREE 430747 CLUSTER

AGENTS:

Tree 430747 | Mycorrhiza | Earthworm 34

STATUS:

hungry

CURRENT ACTION:

communicate

NEEDS:

NUTRITION: BIT LOW

LIGHT: -

SOIL MOISTURE: BIT LOW

ACTIVITY HISTORY:

10:42:09

I am sending signals to nearby tree 430746 cluster to ask for nutrients.

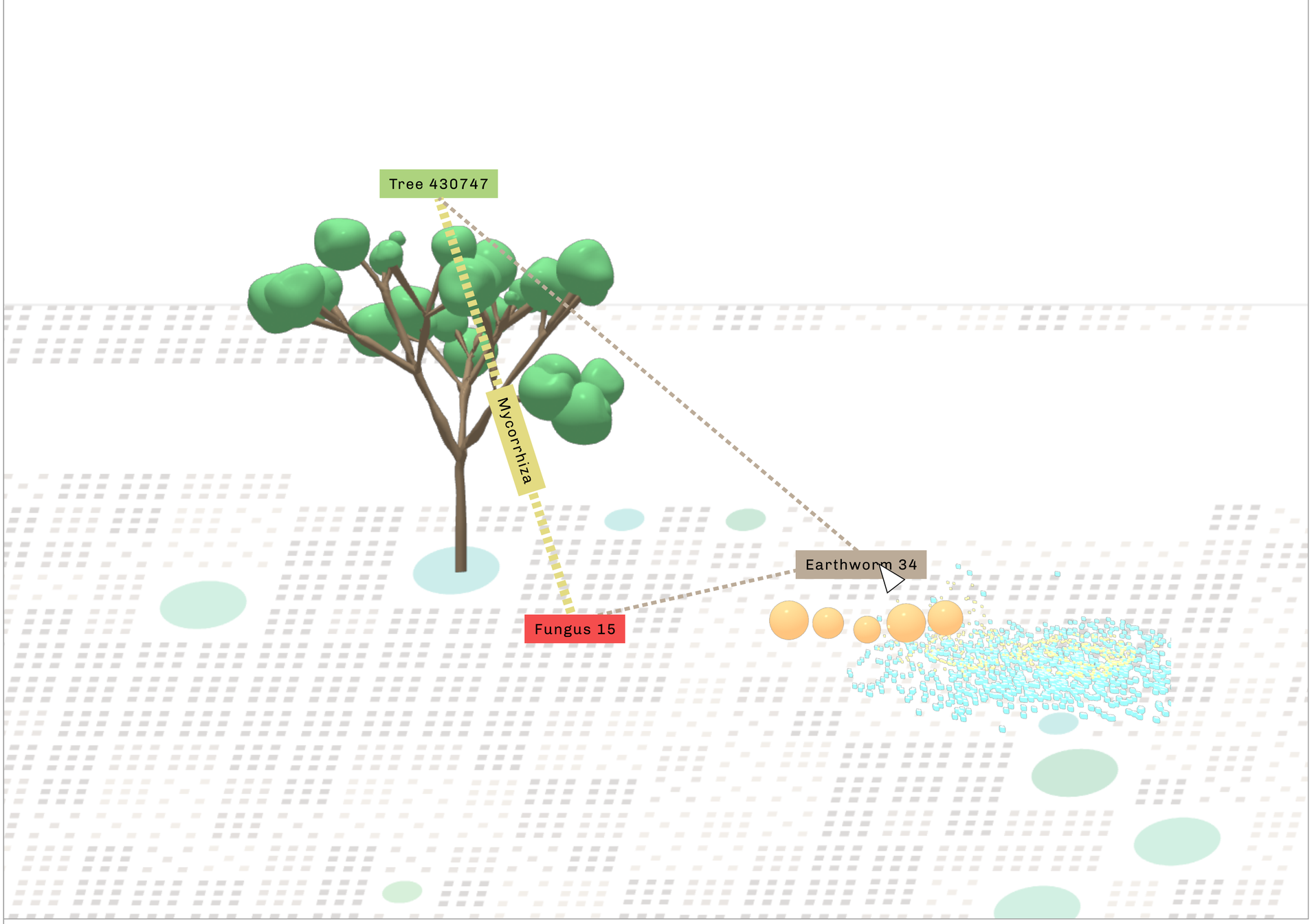
10:30:22

Decrease in earthworm population detected in the last 3 months. The long-term impact on less nutrients in soil is estimated.

07:06:23

Mycorrhiza received and responded to water and nutrient request from the nearby tree 430750 cluster.

20:24:11



DESIGN TIMELINE

EARTHWORM 34

STATUS:

tenacious

CURRENT ACTION:

burrow down

NEEDS:

TEMPERATURE: TOO COLD

LIGHT: -

SOIL MOISTURE: BIT LOW

HUNGER: -

REPRODUCE: -

EXCRETE: -

VIBRATION: WARNING

ACTIVITY HISTORY:

10:42:09

I want to burrow down because it is too cold. The lower soil feels more dense which requires more energy.

10:30:22

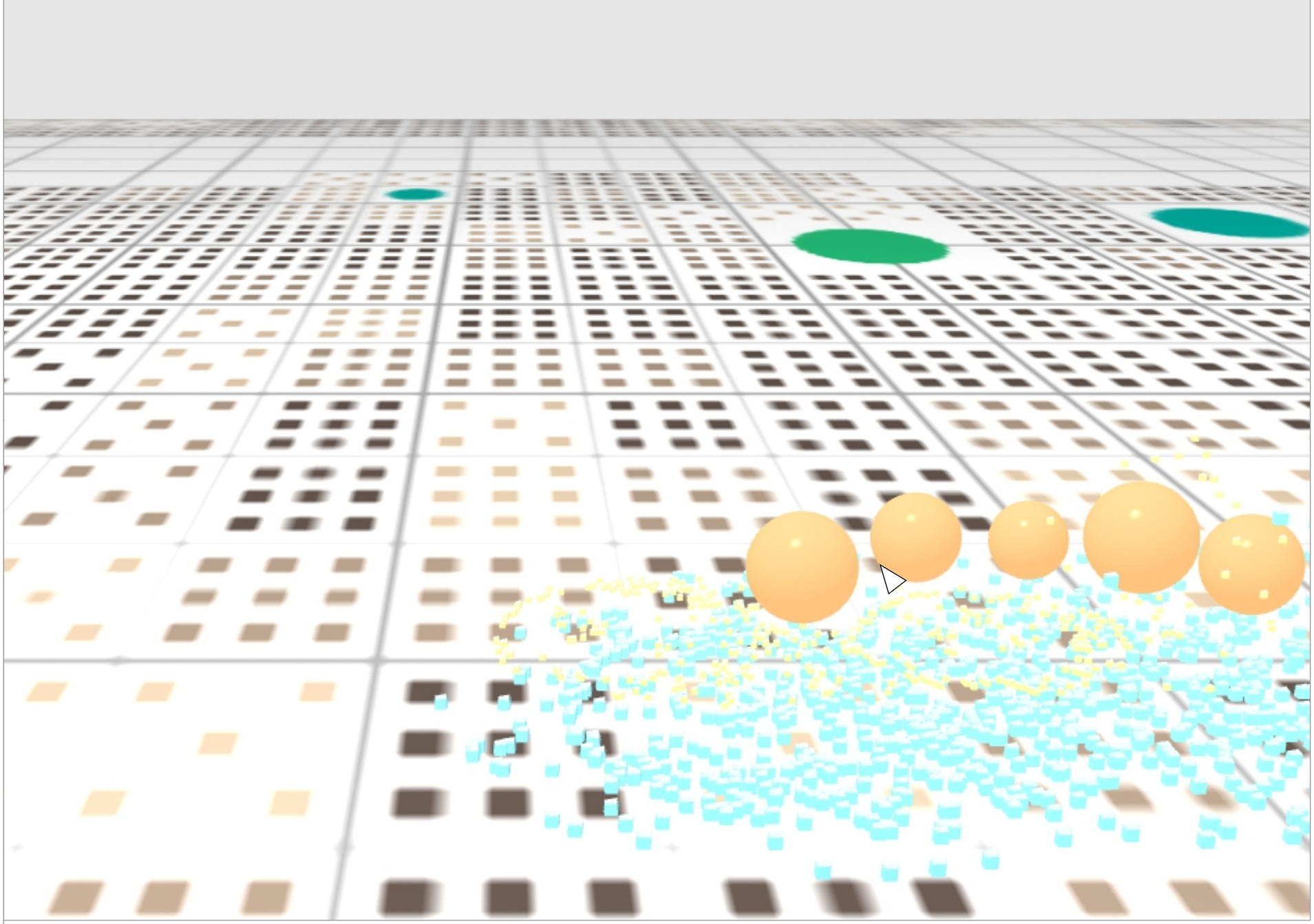
The sunlight is getting intense. I will burrow down.

07:06:23

I cannot breathe because the soil is too moist due to morning rain. I will burrow up.

20:24:11

I will burrow up to make casting since the sun is down.



DESIGN TIMELINE

EARTHWORM 34

STATUS:
tenacious

CURRENT ACTION:
burrow down

NEEDS:

TEMPERATURE: TOO COLD

LIGHT: -

SOIL MOISTURE: BIT LOW

HUNGER: -

REPRODUCE: -

EXCRETE: -

VIBRATION: WARNING

ACTIVITY HISTORY:

10:42:09

I want to burrow down because it is too cold. The lower soil feels more dense which requires more energy.

10:30:22

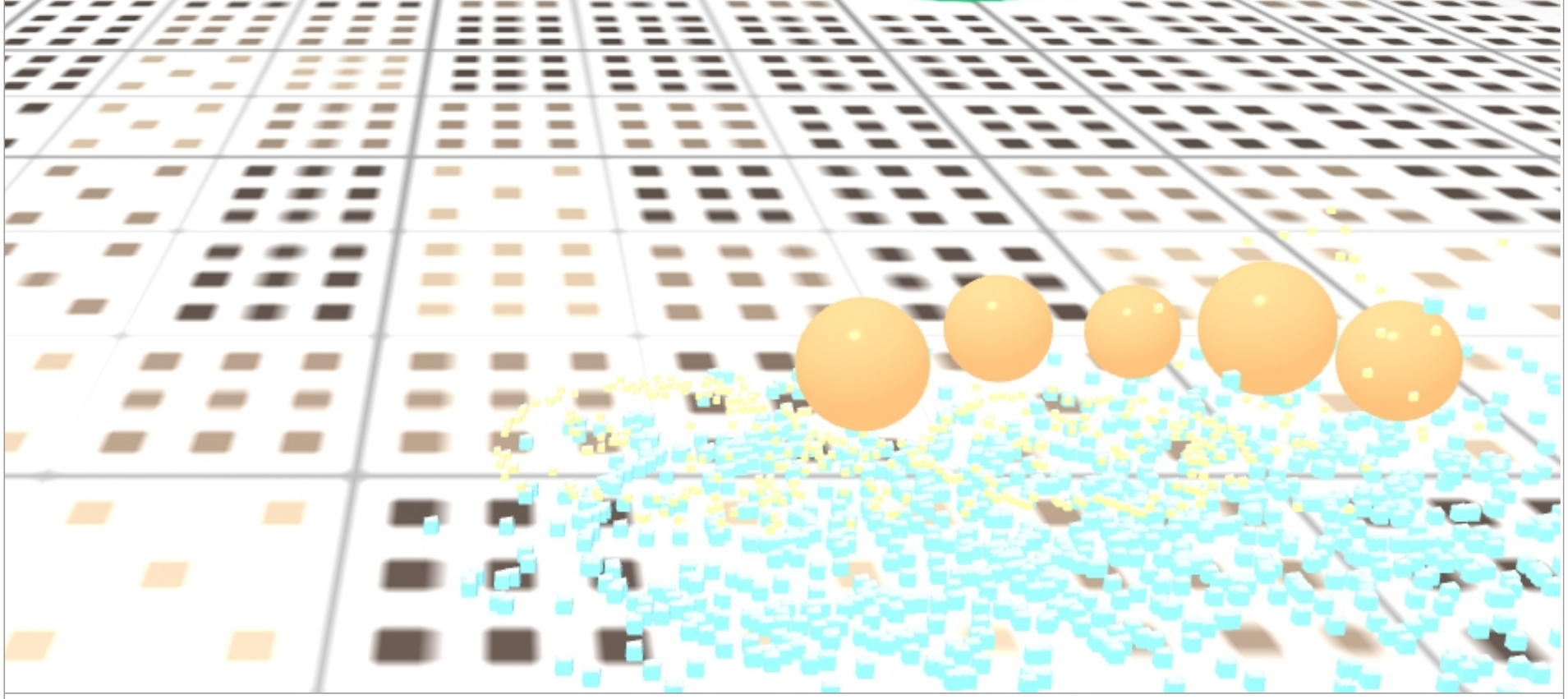
The sunlight is getting intense. I will burrow down.

07:06:23

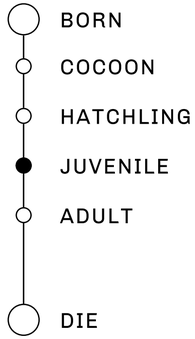
I cannot breathe because the soil is too moist due to morning rain. I will burrow up.

20:24:11

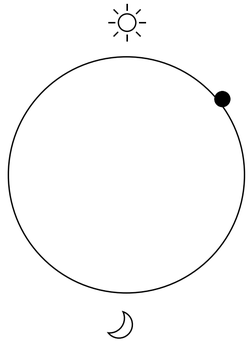
I will burrow up to make casting since the sun is down.



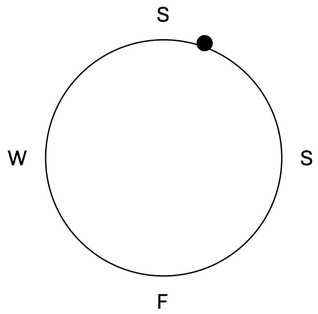
LIFE CYCLE:



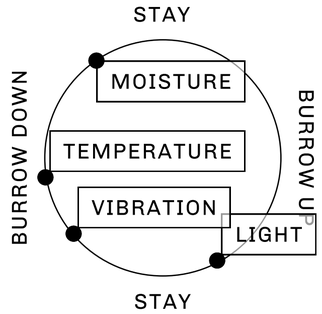
DAY / NIGHT CLOCK:



SEASONAL CLOCK:



BIOLOGICAL CLOCK:



DESIGN TIMELINE

EARTHWORM 34

STATUS:
tenacious

CURRENT ACTION:
burrow down

NEEDS:

TEMPERATURE: TOO COLD

LIGHT: -

SOIL MOISTURE: BIT LOW

HUNGER: -

REPRODUCE: -

EXCRETE: -

VIBRATION: WARNING

ACTIVITY HISTORY:

10:42:09

I want to burrow down because it is too cold. The lower soil feels more dense which requires more energy.

10:30:22

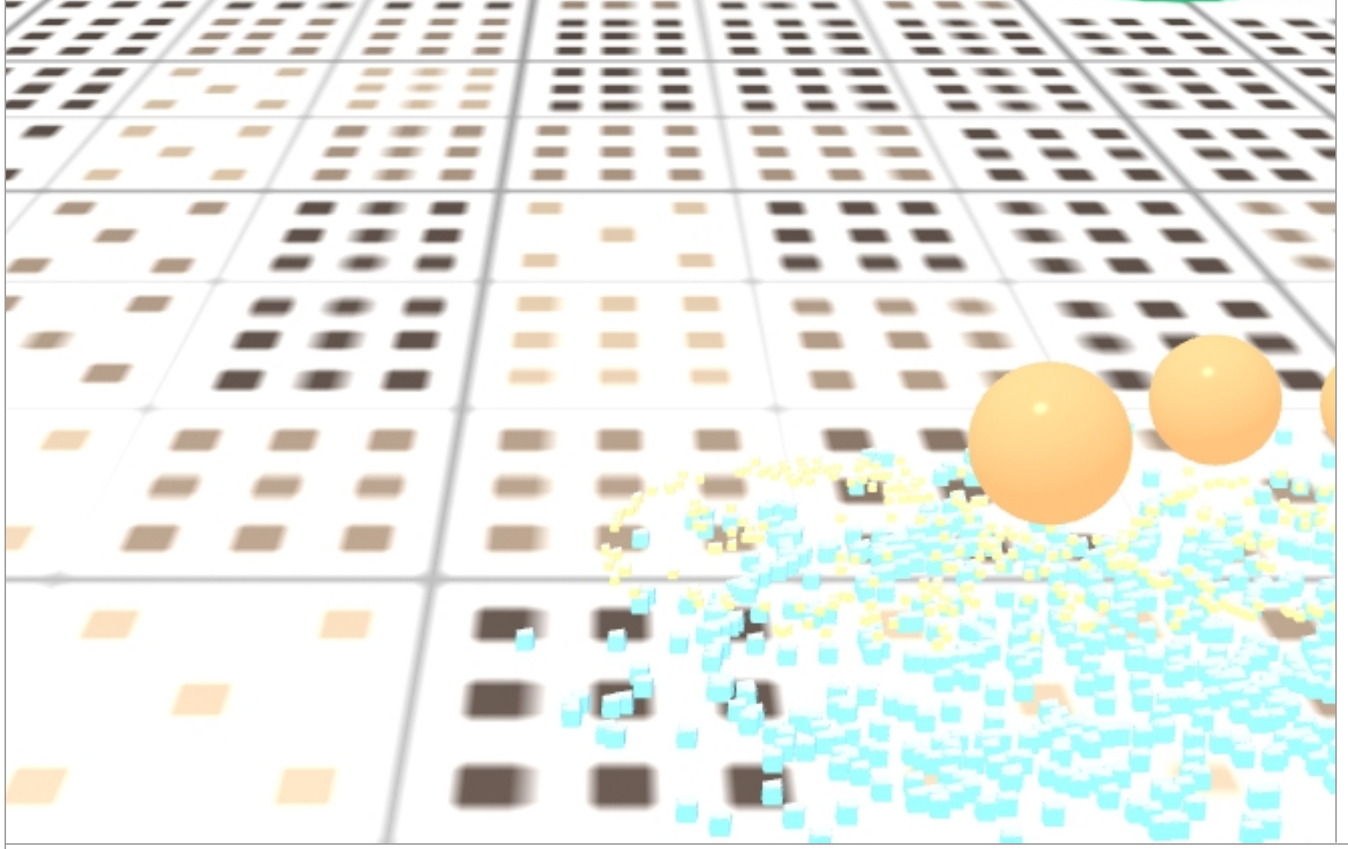
The sunlight is getting intense. I will burrow down.

07:06:23

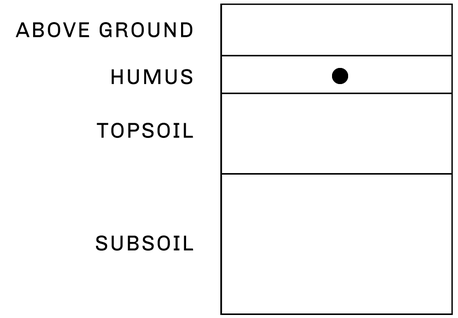
I cannot breathe because the soil is too moist due to morning rain. I will burrow up.

20:24:11

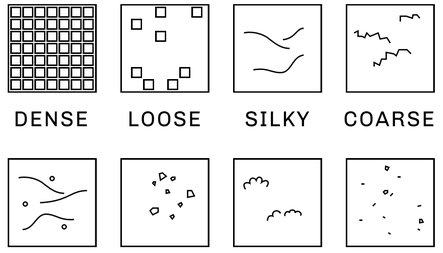
I will burrow up to make casting since the sun is down.



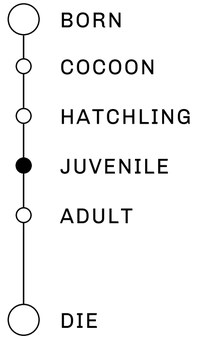
SOIL LAYERS:



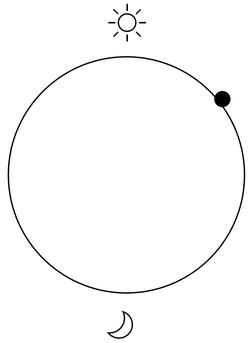
SOIL TEXTURE:



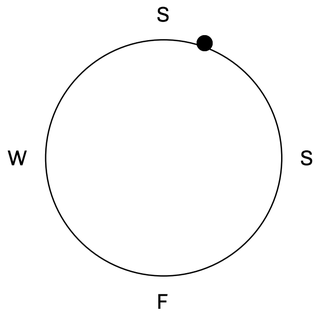
LIFE CYCLE:



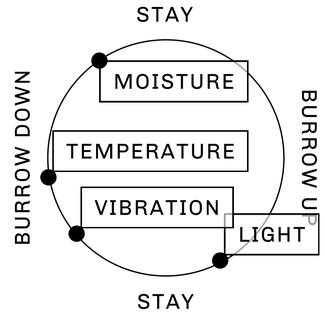
DAY / NIGHT CLOCK:



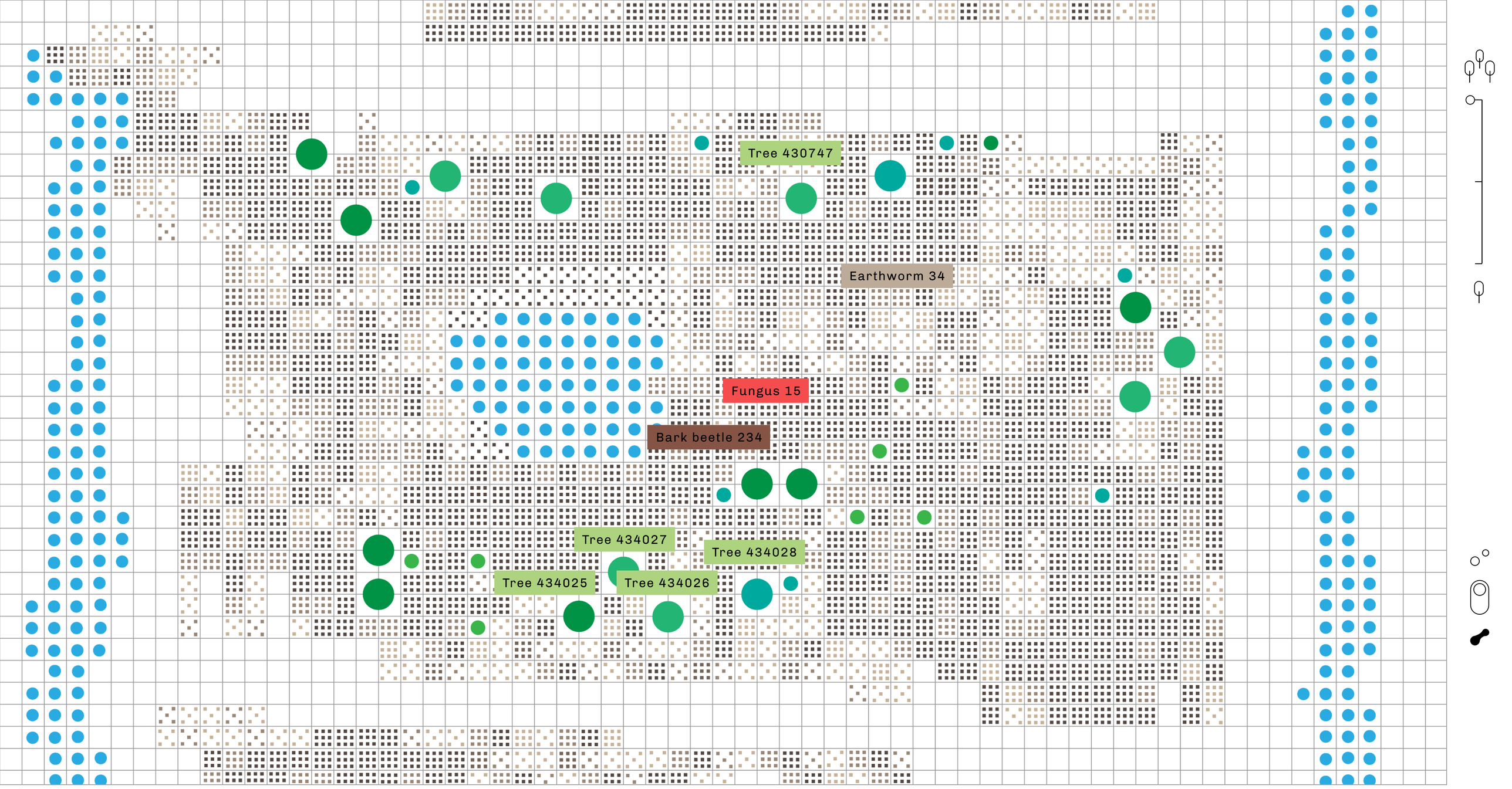
SEASONAL CLOCK:



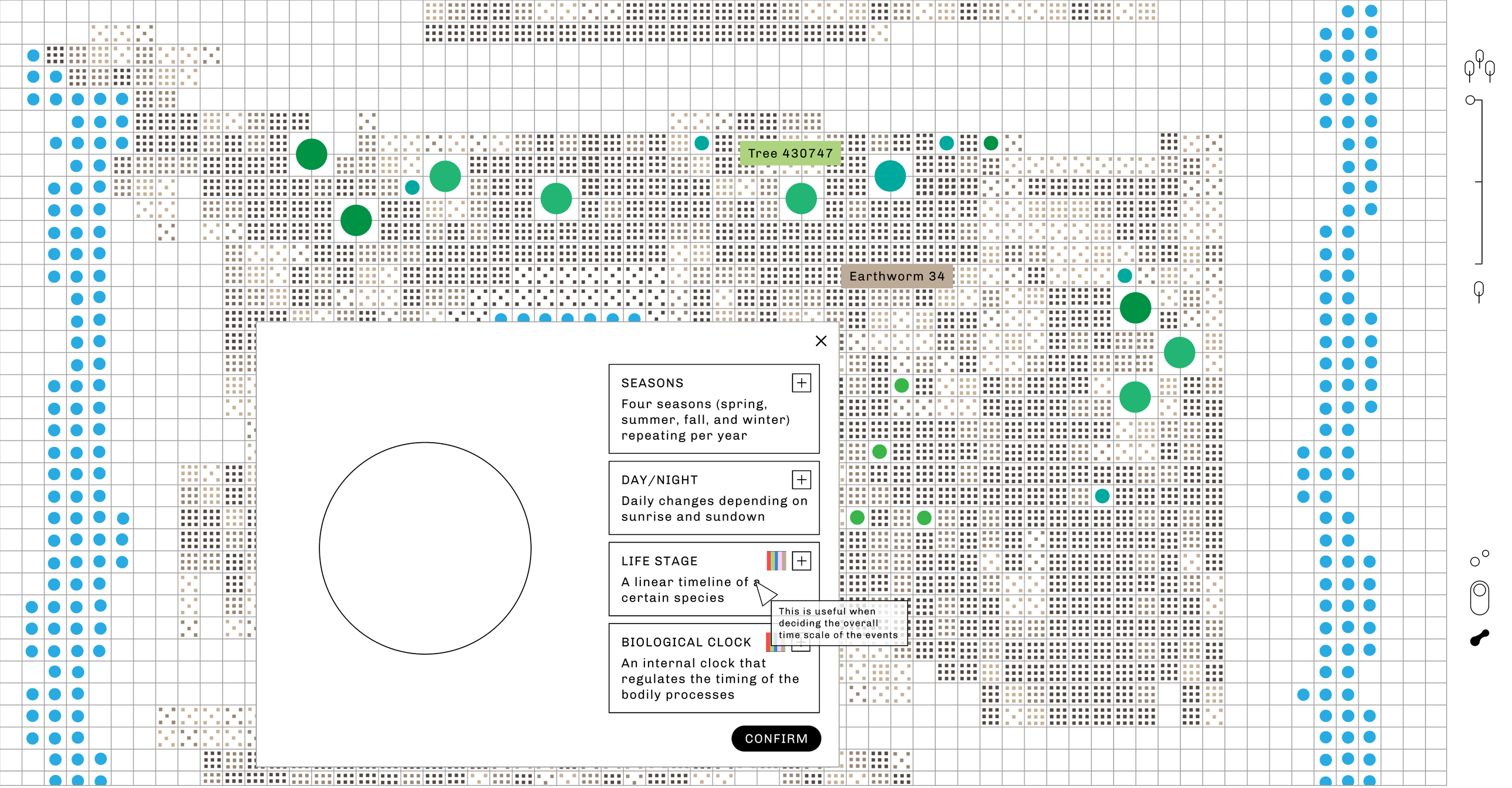
BIOLOGICAL CLOCK:



DESIGN TIMELINE



DESIGN TIMELINE


Tree 430747
Earthworm 34
SEASONS
Four seasons (spring, summer, fall, and winter) repeating per year
DAY/NIGHT
Daily changes depending on sunrise and sundown
LIFE STAGE
A linear timeline of a certain species
This is useful when deciding the overall time scale of the events
BIOLOGICAL CLOCK
An internal clock that regulates the timing of the bodily processes
CONFIRM
DESIGN TIMELINE

Tree 430747

Earthworm 34

S

W

S

F

SEASONS

Four seasons (spring, summer, fall, and winter) repeating per year

DAY/NIGHT

Daily changes depending on sunrise and sundown

LIFE STAGE

A linear timeline of a certain species

BIOLOGICAL CLOCK

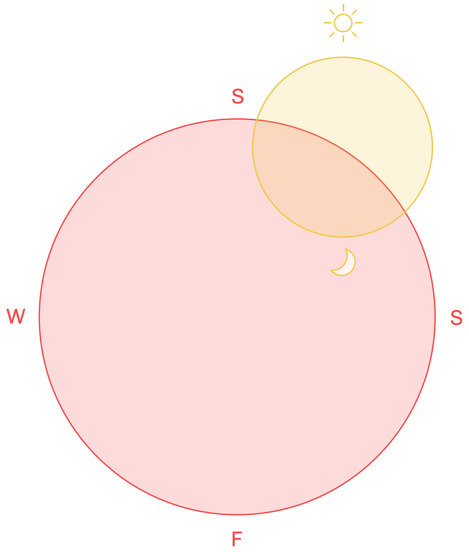
An internal clock that regulates the timing of the bodily processes

CONFIRM

DESIGN TIMELINE

Tree 430747

Earthworm 34



SEASONS

Four seasons (spring, summer, fall, and winter) repeating per year

DAY/NIGHT

Daily changes depending on sunrise and sundown

LIFE STAGE

A linear timeline of a certain species

BIOLOGICAL CLOCK

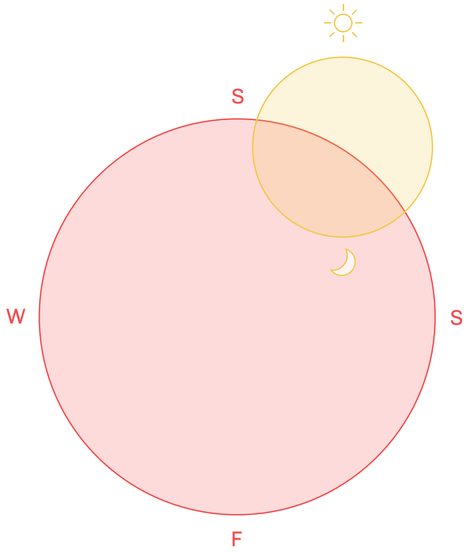
An internal clock that regulates the timing of the bodily processes

CONFIRM

DESIGN TIMELINE

Tree 430747

Earthworm 34



SEASONS

Four seasons (spring, summer, fall, and winter) repeating per year

DAY/NIGHT

Daily changes depending on sunrise and sundown

LIFE STAGE

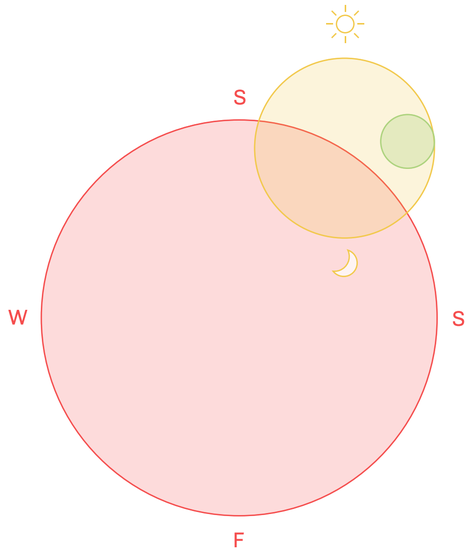
- Tree 430747
- Mycorrhiza 34
- Earthworm 34
- Fungus 15
- Spring 2023

CONFIRM

DESIGN TIMELINE

Tree 430747

Earthworm 34



SEASONS

Four seasons (spring, summer, fall, and winter) repeating per year

DAY/NIGHT

Daily changes depending on sunrise and sundown

LIFE STAGE

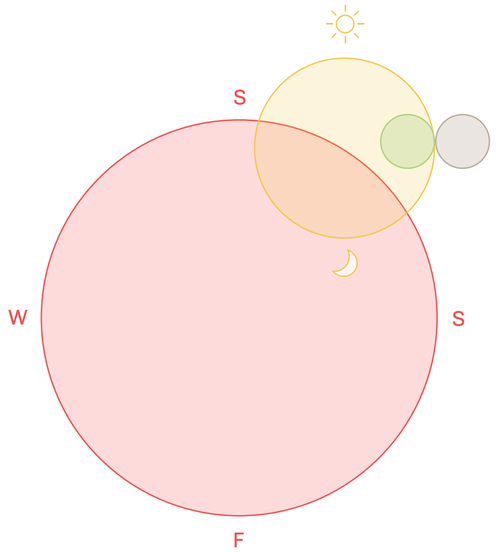
- Tree 430747
- Mycorrhiza 34
- Earthworm 34
- Fungus 15
- Spring 2023

CONFIRM

DESIGN TIMELINE

Tree 430747

Earthworm 34



SEASONS

Four seasons (spring, summer, fall, and winter) repeating per year

DAY/NIGHT

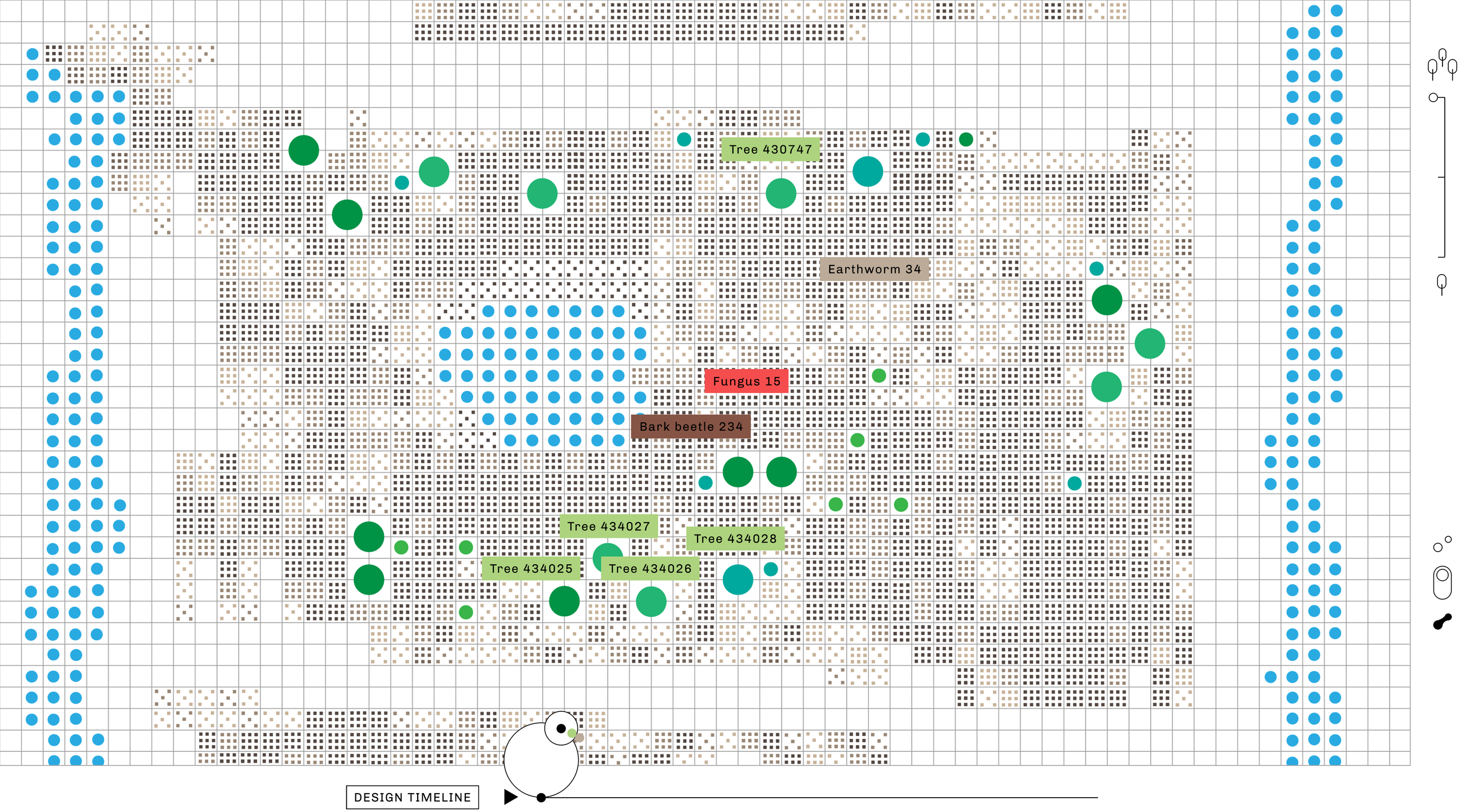
Daily changes depending on sunrise and sundown

LIFE STAGE

- Tree 430747
- Mycorrhiza 34
- Earthworm 34
- Fungus 15
- Spring 2023

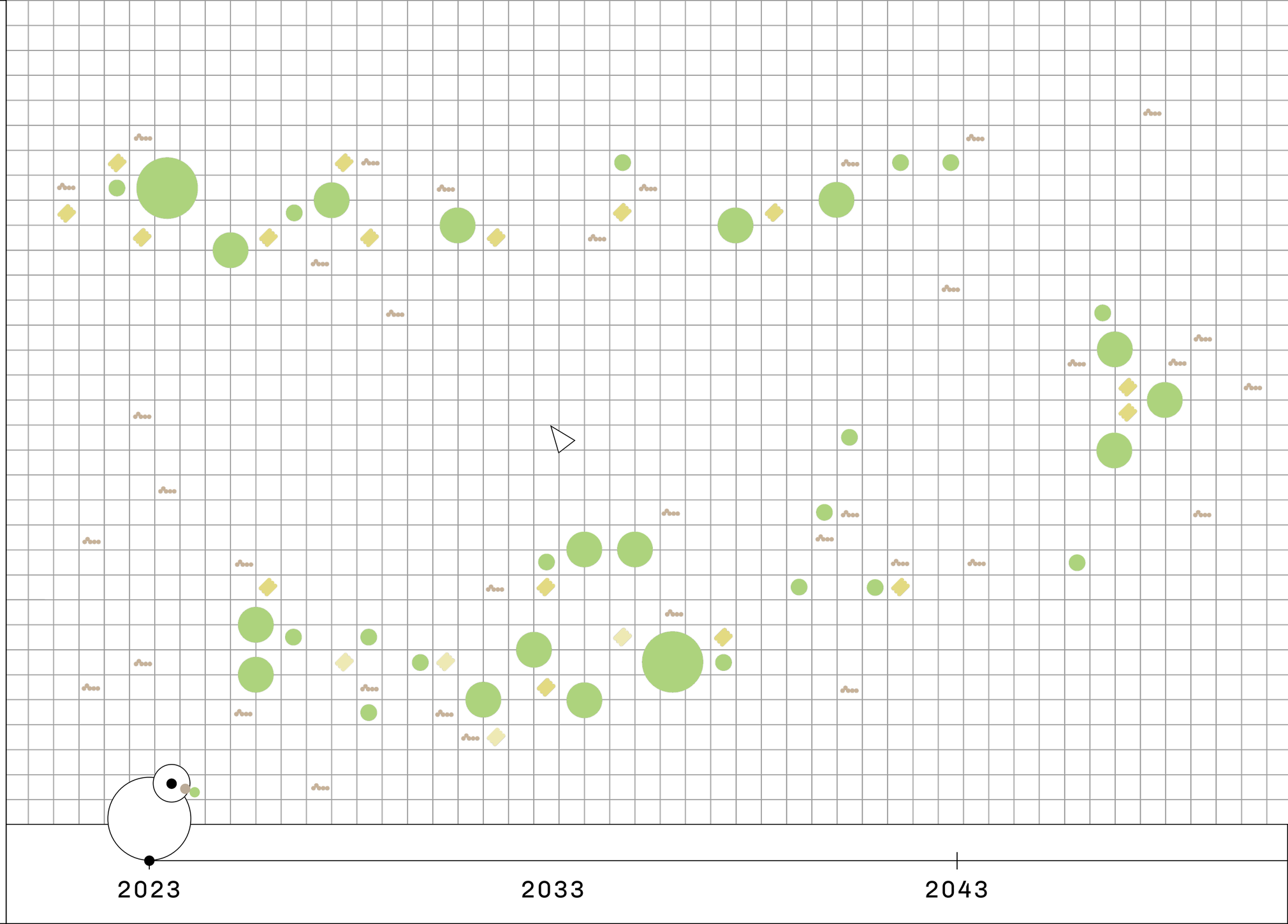
CONFIRM

DESIGN TIMELINE


Tree 430747
Earthworm 34
Fungus 15
Bark beetle 234
Tree 434027
Tree 434028
Tree 434025
Tree 434026
DESIGN TIMELINE

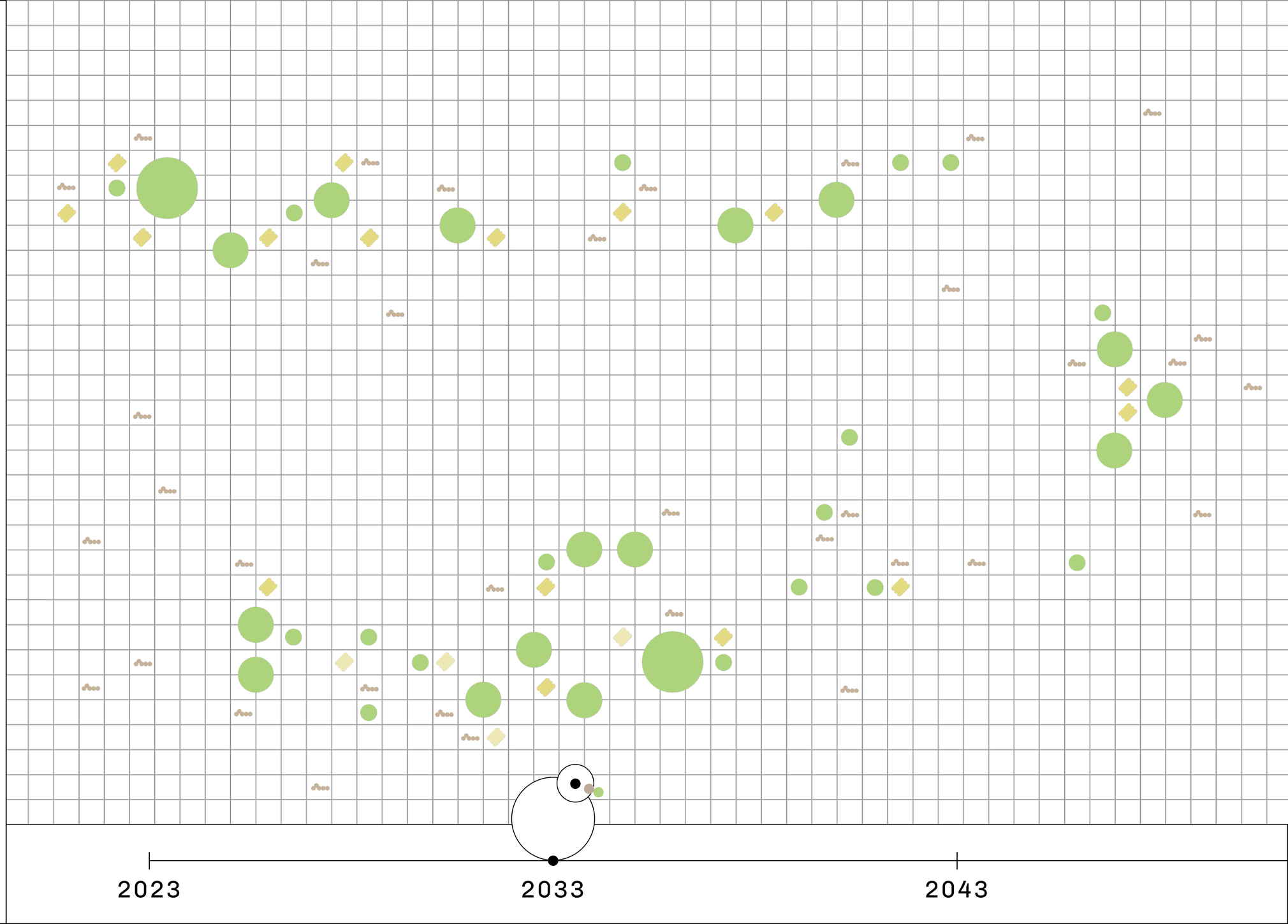
SIMULATION 026

- Tree
- Earthworm
- Mycorrhiza

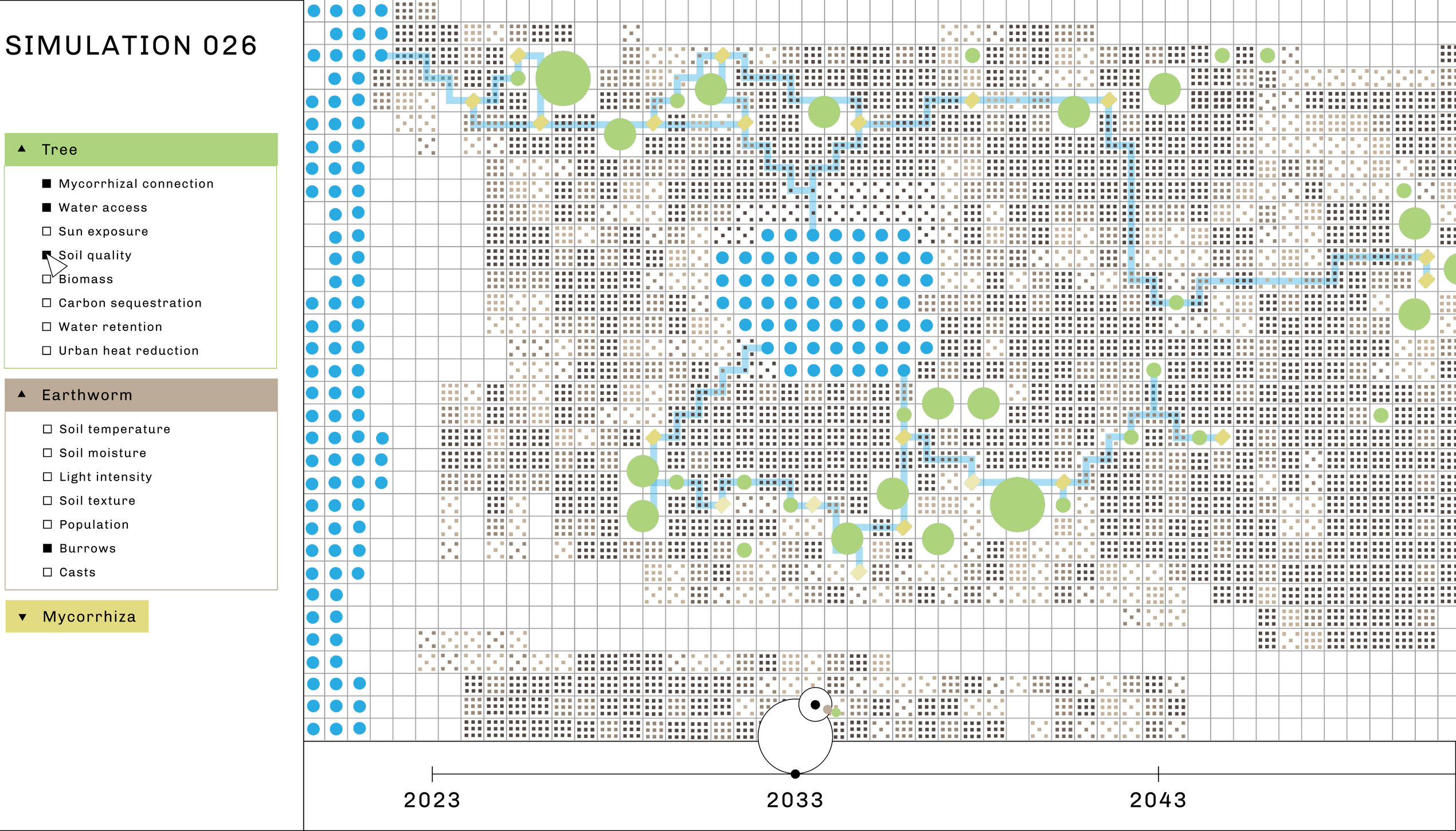


SIMULATION 026

- ▲ Tree
  - ☐ Mycorrhizal connection
  - ☐ Water access
  - ☐ Sun exposure
  - ☐ Soil quality
  - ☐ Biomass
  - ☐ Carbon sequestration
  - ☐ Water retention
  - ☐ Urban heat reduction
- ▼ Earthworm
- ▼ Mycorrhiza



SIMULATION 026



SIMULATION 026