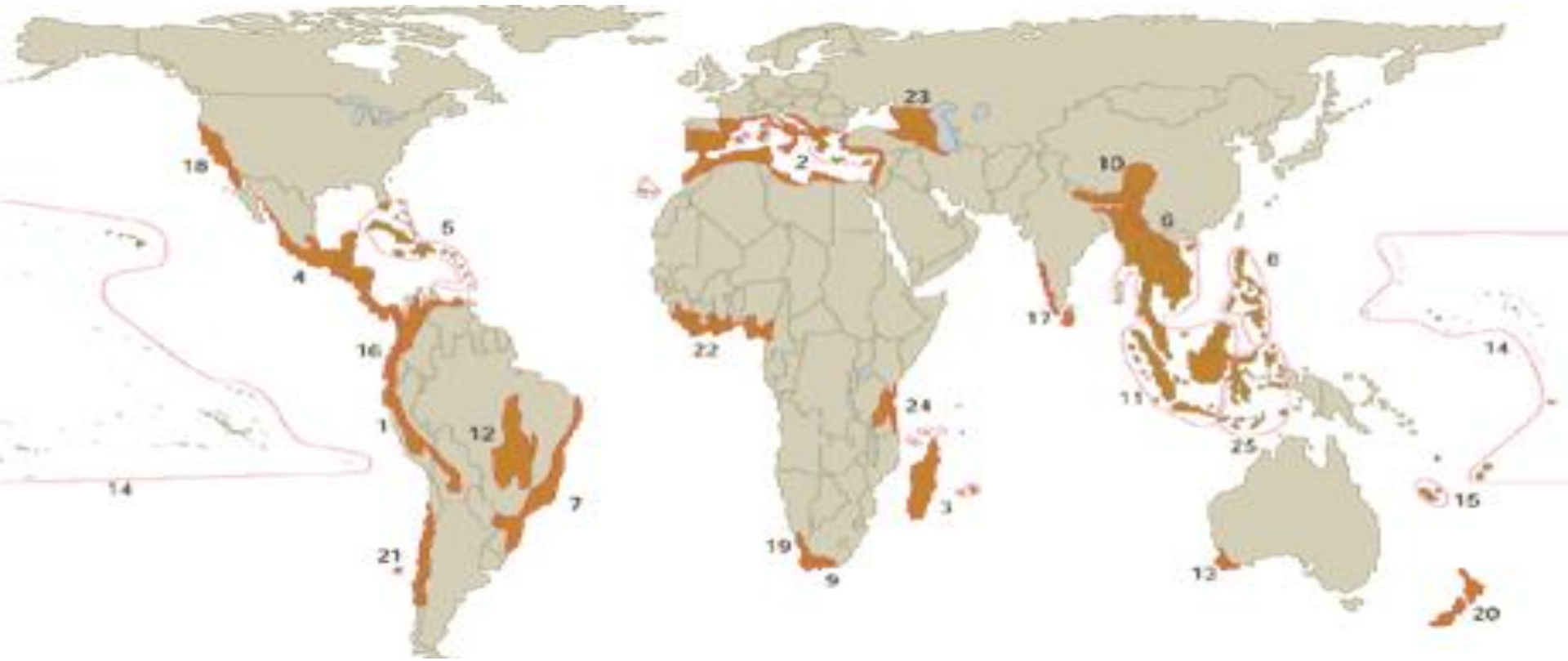
ESCI 1 Lab #2:
Plant Communities and extinction

- **Check in**
- **Review from Lab 1**
- **Bay area maps**
- **Tree Keying**
- **ESA group activity**
- **Lecture :** Species extinction and conservation
- **Check out**

Field Trip #1: Henry Cowell State Park

- Lab #3 – Friday, April 27th
- Meet in main parking lot @ 11:20 am til 1:20pm
- Travel time will be included in the lab time getting to site but not dismissal.
- Lab #11 on campus session will be shortened in lieu of this longer lab.
- Redwood ecology, trees of the Santa Cruz Mts. – Species richness
- DON'T BE LATE !!!!

Biodiversity Hot spots



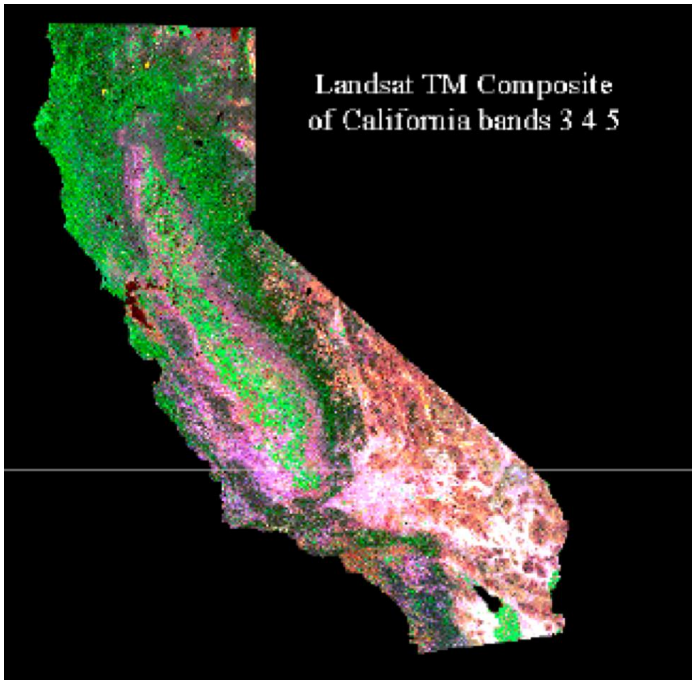
- A biogeographic region that is both a significant reservoir of biodiversity and is threatened with destruction.
- There are 25 biodiversity “hotspots” worldwide
- Tropical forests are the centers of biological diversity!
- ***California floristic province*** is one of the 25 “biological hotspots” in the world!

California Floristic Province

The California Floristic Province includes:

- Klamath Region of NW part of state and adjacent SW Oregon
- along with that portion of California west of Cascade-Sierra Nevada-Transverse-Peninsular range axis and
- a part of Northern Baja California
- excludes the deserts which are shared with other states

California's Biodiversity



Why is California Such a special place?

- Ranked at or near the top for biodiversity among other 50 states
- Ecological Island:
  - Separated by it's high mountains from the rest of the continent
  - California's biological diversity is the product of the variability of its topography, climate, and soil types.
  - Physical complexity- an array of specialized habitat types

High level of endemic flora and fauna

Areas of species richness

California Floristic Province

Endemic - species restricted to a particular locality or habitat within the state

Plants:

- 6300 native species of vascular plants, gymnosperms & ferns in the state of California.
- 3500 native species of vascular plants in the Calif. Floristic Province, 61% found nowhere else in the world. (55% of total in Calif.)

Endemic species in California

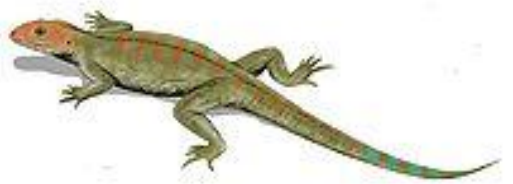
Birds = 668 total
340 in CFP
10 endemic

Mammals= 221 total (land & sea)
150 in CFP
20 endemic

Reptiles= 70 in CFP
4 endemic

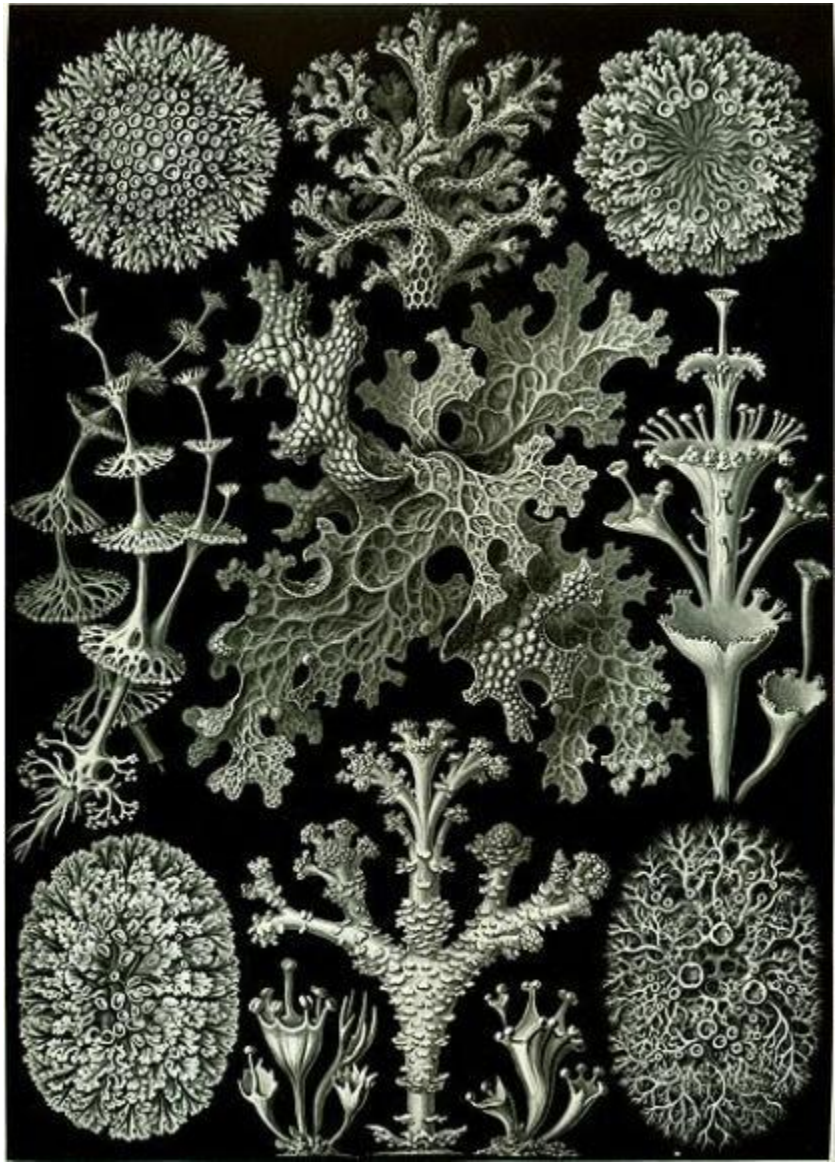
Amphibians= 50 in CFP
25 endemic

Fresh water Fish= 70



Lab 1 Concepts Review

- Wildlife corridor
- 37th parallel
- biological hotspot
- biodiversity
- species richness
- habitat fragmentation



Biodiversity

- **<u>Biodiversity includes 4 major areas:</u>**
  - ➲**Species diversity**
  - ➲**Genetic diversity**
  - ➲**Ecological diversity**
  - ➲**Functional diversity**

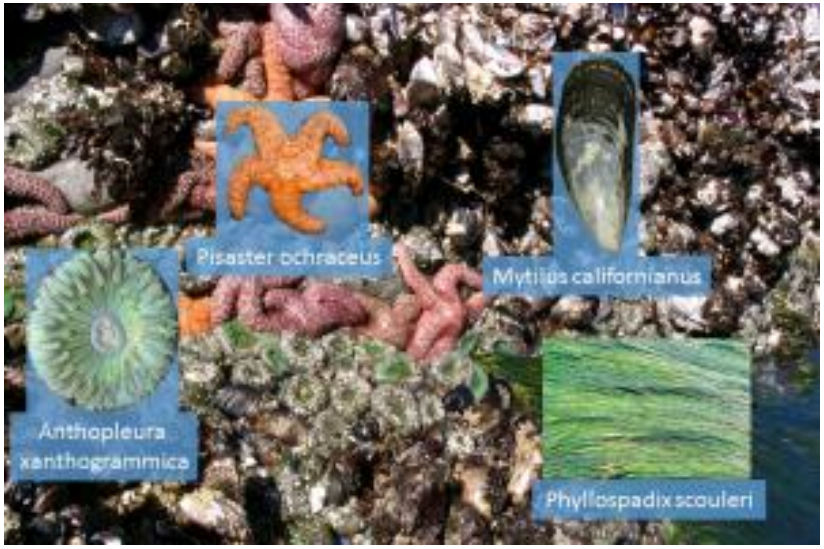
Biodiversity

What is the biodiversity?

Includes:

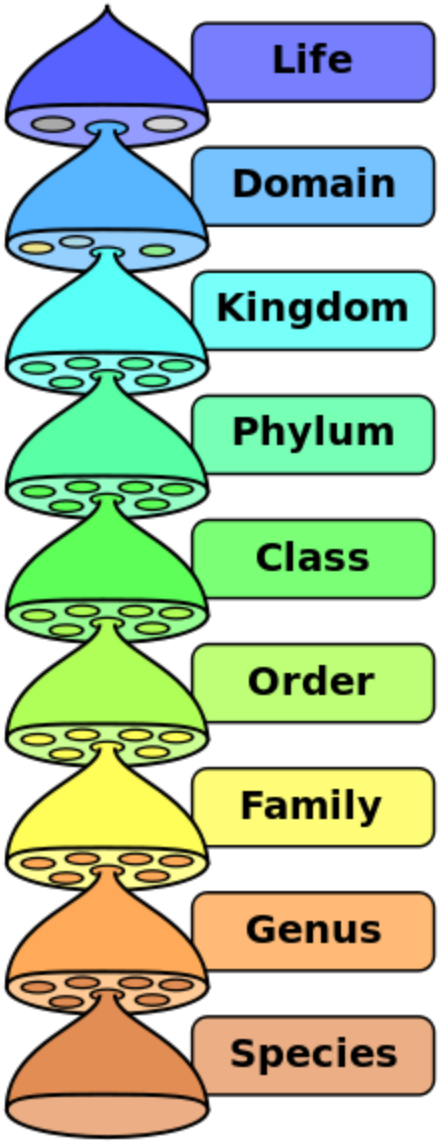
- **Species diversity** A variety of different species living is a particular site.
- **Genetic diversity** Variety among individuals within a species.
- **Ecological diversity** variety o ecosystems

- **<u>Functional diversity</u>** variety of functional components that species occupy within a specific community



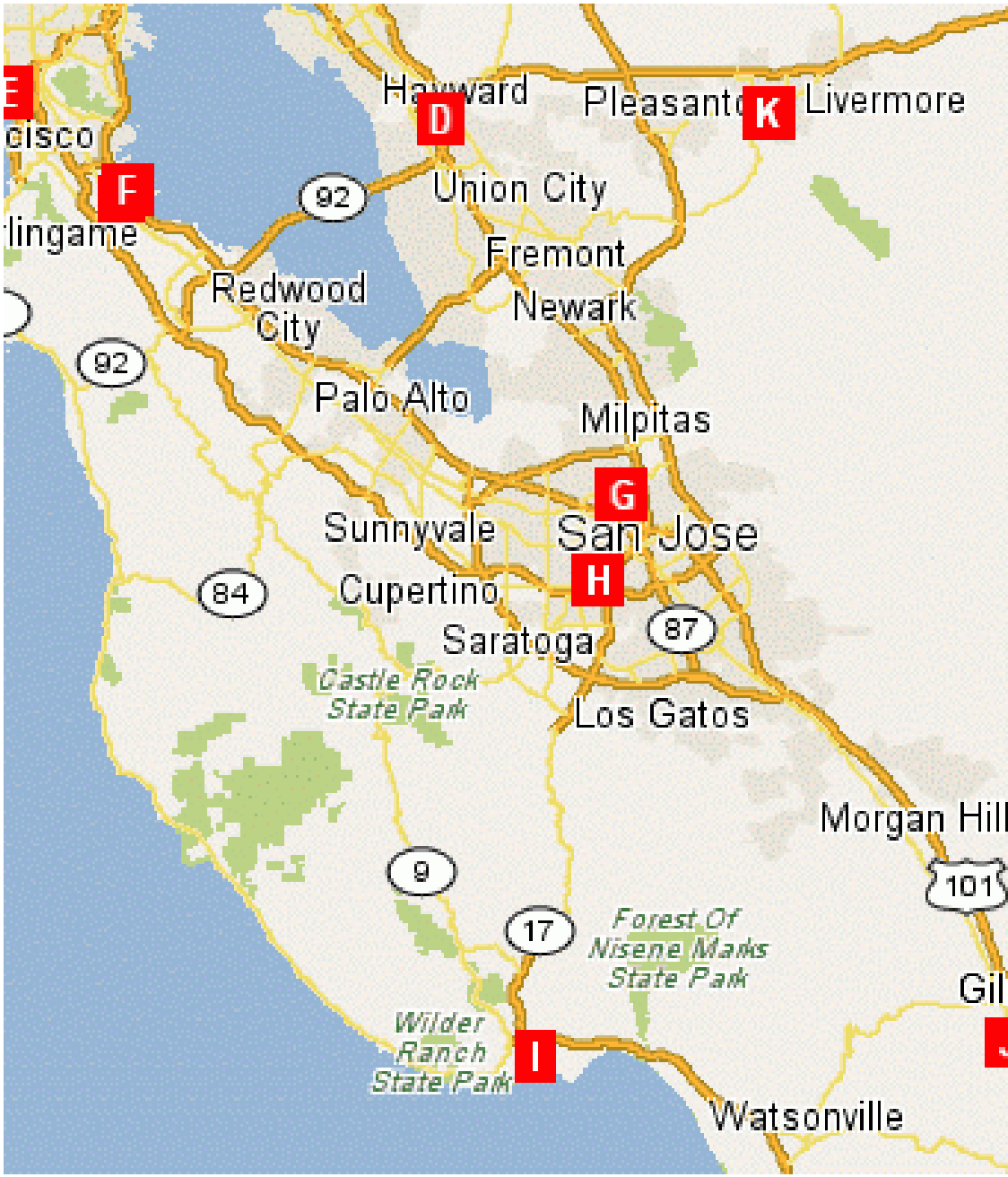
Concept Review

- Habitat
- Habitat fragmentation
- Ecosystem
- Population
- Species
- Species richness



BAY Area Map:

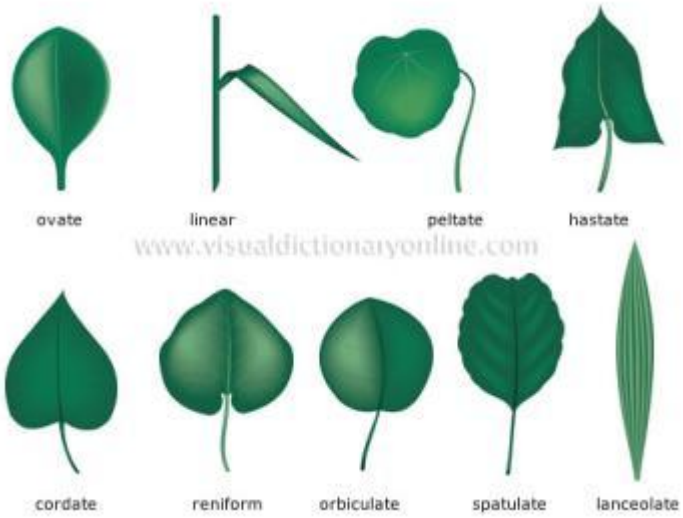
- Draw the Southern Bay area
- Major communities.
- 2 major mountain ranges
- Major highways
- We will be using this map throughout the quarter.



TREE KEYING ACTIVITY

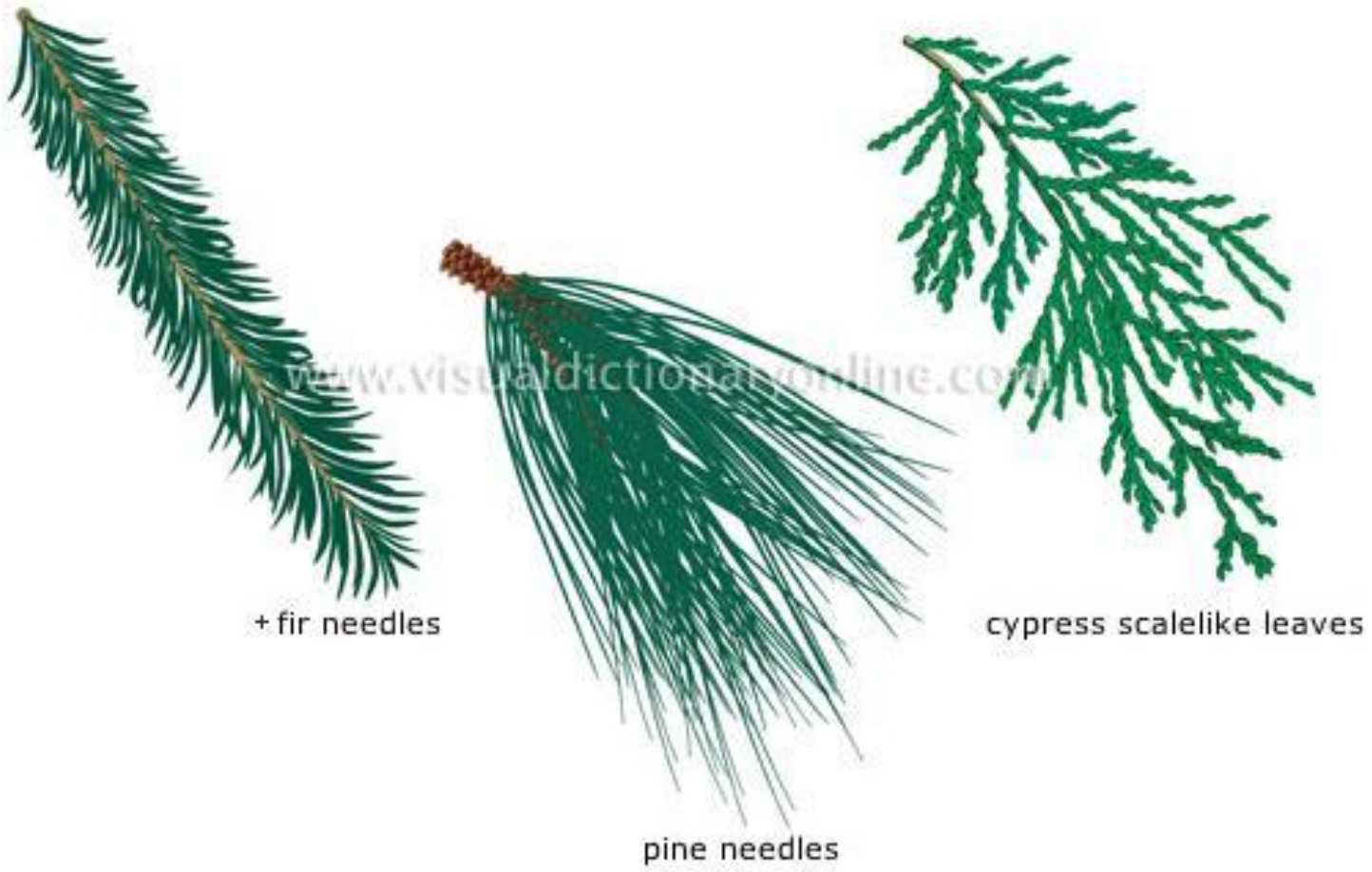
THINGS TO REMEMBER !

Simple leaves



Compound leaves

NEEDLES AND SCALE-LIKE LEAVES



CALIFORNIA'S PLANT COMMUNITIES

Natural components effecting the location and characteristics of plant communities:

- topography
- sun exposure
- precipitation(rainfall)
- soil type

<u>Terms:</u>

niche
Limiting factor
Rain-shadow effect
Community
Dominant species
Abiotic and biotic elements

Abiotic components

- **Abiotic -Nonliving** component of the environment; the interplay of many physical and chemical factors
  - **Conditions:** (Conditions are abiotic factors that vary in space and time but are not used up or made unavailable to other species)
    - Temperature (heat, cold)
    - Wind
    - pH (acidity)
    - Salinity (saltiness)
    - Fire

Abiotic components

- **Abiotic -Nonliving** component of the environment ; the interplay of many physical and chemical factors
  - **Resources:** (Resources are any factors - biotic or abiotic - that are consumed by organisms
  - ***Abiotic resources*** include:
    - Water
    - Sunlight
    - Oxygen
    - Chemical Nutrients (anything that sustains life - Carbon, Nitrogen, Oxygen, Phosphorus, etc.)
    - Spatial needs (rock intertidal zone, hole in tree)

Biotic components

- **Biotic (living)** component of the environment:
  - Producers (autotrophs)
    - Plants, phytoplankton, some bacteria, some protists
  - Consumers (heterotrophs)
    - Herbivores, carnivores, omnivores
    - Animals, zooplankton, some bacteria, some protists, fungi
  - Decomposers & Detritivores
    - **Detritus** - Dead biotic material (leaves, branches, dead grass, fecal wastes of animals, & dead animal bodies)
      - Decomposers(organisms secrete enzymes that break down or "rots" detritus): Fungi, bacteria
      - Detritivores (feed on detritus) : Earthworms, , millipedes, wood beetles, fiddler crabs, termites, ants feed on detritus

Biotic components

- Living components:
- **Organisms** (any form of life - bacteria, protists, fungi, animals, plants)
- Organisms classified into:
    - **Biological Species** (organisms that are structurally similar, interbreed and produce fertile offspring (not hybrids)
    - **Population** (members of a species which are found in a specific geographic location in a specific time)

Tree Keying and ESA Group Activity

-BREAK INTO YOUR GROUPS.

-PICK UP THE ESA CONCEPTS MAPS AND ACTIVITY SHEET (ONE OF EACH FOR EACH PERSON)

-ONE TREE KEYING BOOKLET (ONE OR TWO PER GROUP)

Extinction

- Extinction is a natural occurrence on earth- an important part of evolution
- More than 90% of all the organisms that have ever lived on Earth are extinct.
- 5 major mass extinctions in the fossil record

Life on Earth

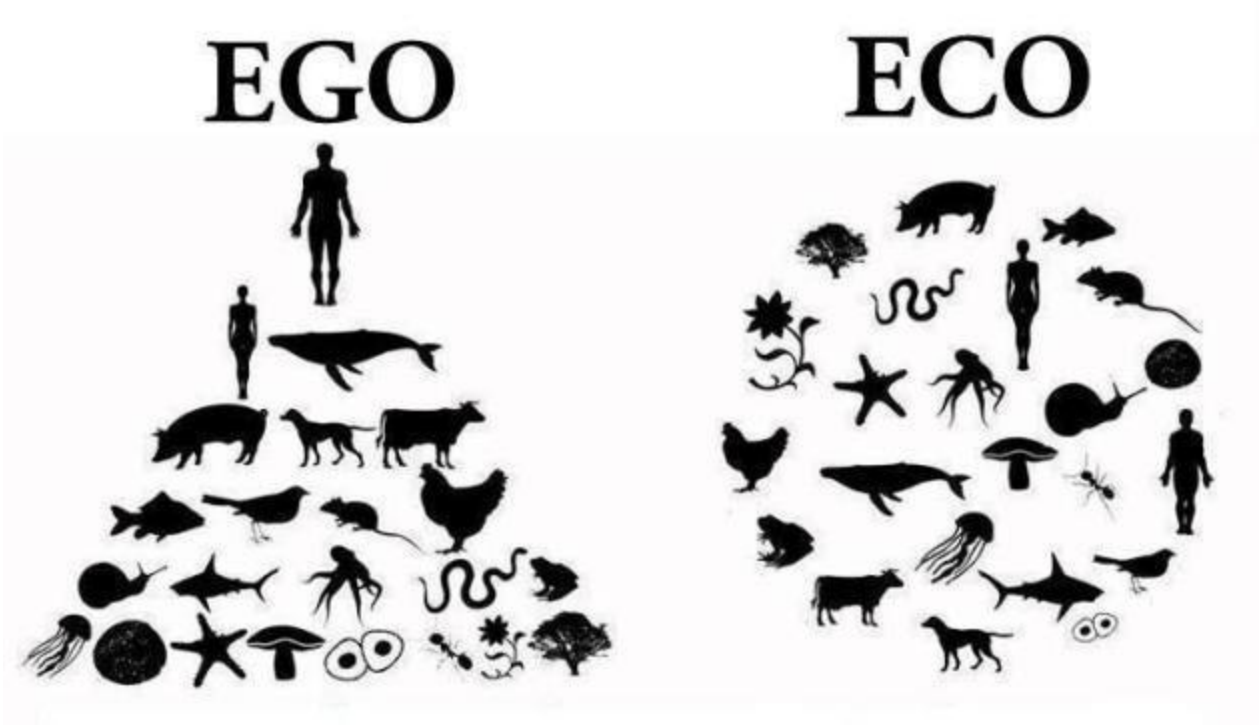
- It is estimated that 8.7 million species exist on earth today
- There are 1.7 million or 20% of the total that we have named and identified.
- 13,000 species are added to that list every year.
- ¾'s of species are on land (insects), ¼ in the sea have yet to be identified, described and cataloged.

Anthropocene Epoch

Actual time line is debatable

- 11,700 years ago beginning of agriculture
- 300 years ago industrial revolution

- Through mining activities alone, humans move more sediment than all the world's rivers combined
- warming the planet,
- raised sea levels,
- eroding the ozone layer
- acidified the oceans.
- Pollution
- Development/habitat loss



"We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect."

— Aldo Leopold

the 6th mass extinction

- 1st mass extinction resulting from the actions of one species.
- Oct. 28th, 2016 –

  Latest WWF estimates, by 2020, 60% of individual organisms will become extinct in the wild.
- We will lose 5,742,000 organisms in the next 4 years - most of which we will never know about.

common characteristics of endangered species

- narrow home range
- narrow food base
- limited reproductive cycle or behavior
- combination of the above factors plus they have a high economic, social or cultural value to humans.

Human life ways through time

Hunter/
Gatherer

Agriculture

Industrial

2 mya (99.5%)

10,000

272

EXTINCTION

Impacts of humans that affect biodiversity:

- Intensification of agriculture and forestry
- climate change
- resource extraction
- invasive alien species introduction
- pollution - air and water
- Wildlife parts trade and poaching