ESM 270 Week 8: Analytic Hierarchy Process (AHP)

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```
library(here)
library(janitor)
library(sf)
library(ggmap)
library(tidyverse)
```

Read in Morro Bay data

```
# species and pu data
# all csv files are unaltered from the xlsx files in the R drive. Just saved as csvs.

spec <- read_csv("MorroBay_spec.csv") %>%
  head(140) %>%
  rename(latin_name = name)

puvsp <- read_csv("MorroBay_puvspr.csv") %>%
  select(1:3) %>%
  head(11849)

# polygons

parcels <- read_sf(dsn = here("MorroBay_data"), layer = "MorroBay_parcels") %>%
  clean_names()
```

Read in AHP output

AHP was done in an excel tool, not here. I am reading in the output from that analysis. We are specifically interested in the cumulative weighted sums for each species.

```
ahp <- read_csv("spec-list-and-criteria.csv") %>%
  clean_names() %>%
  select(-weighted_sum_values_only)

# These ahp data have been separated from the spec id, so need to recombine...

spec_weight <- inner_join(ahp, spec, by = "latin_name") %>%
  rename(species = id) %>%
  select(species, common_name, latin_name, weighted_sum)
```

Combine weight values with planning units and sum based on pu

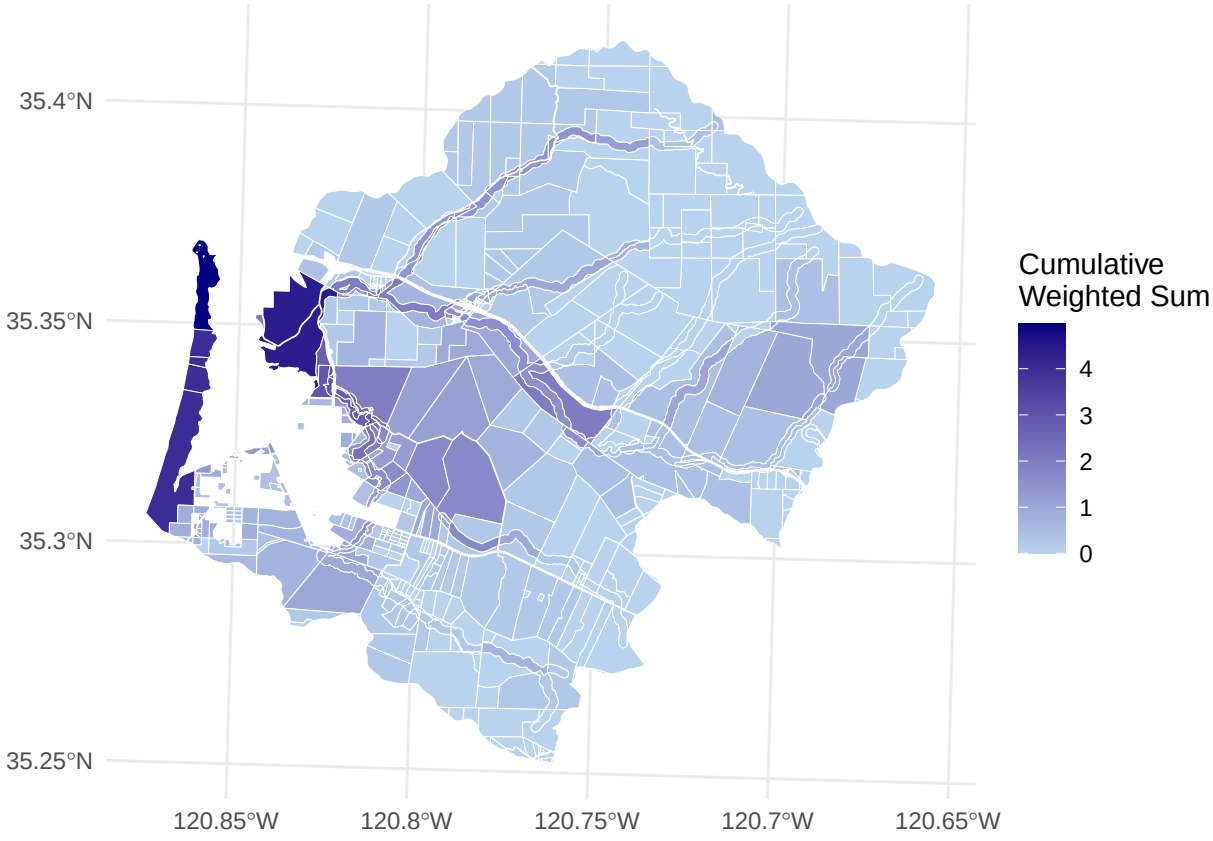
```
puvsp_weight <- left_join(puvsp, spec_weight, by = "species")

pu_weight <- puvsp_weight %>%
  group_by(pu) %>%
  summarize(cum_sum = sum(weighted_sum,
                          na.rm = TRUE)) %>%
  rename(id = pu)
```

Bind cumulative sums to parcel shapes

```
shp_weight <- inner_join(parcels, pu_weight, by = "id") %>%
  select(id, cum_sum) # geometry is sticky and still in df
```

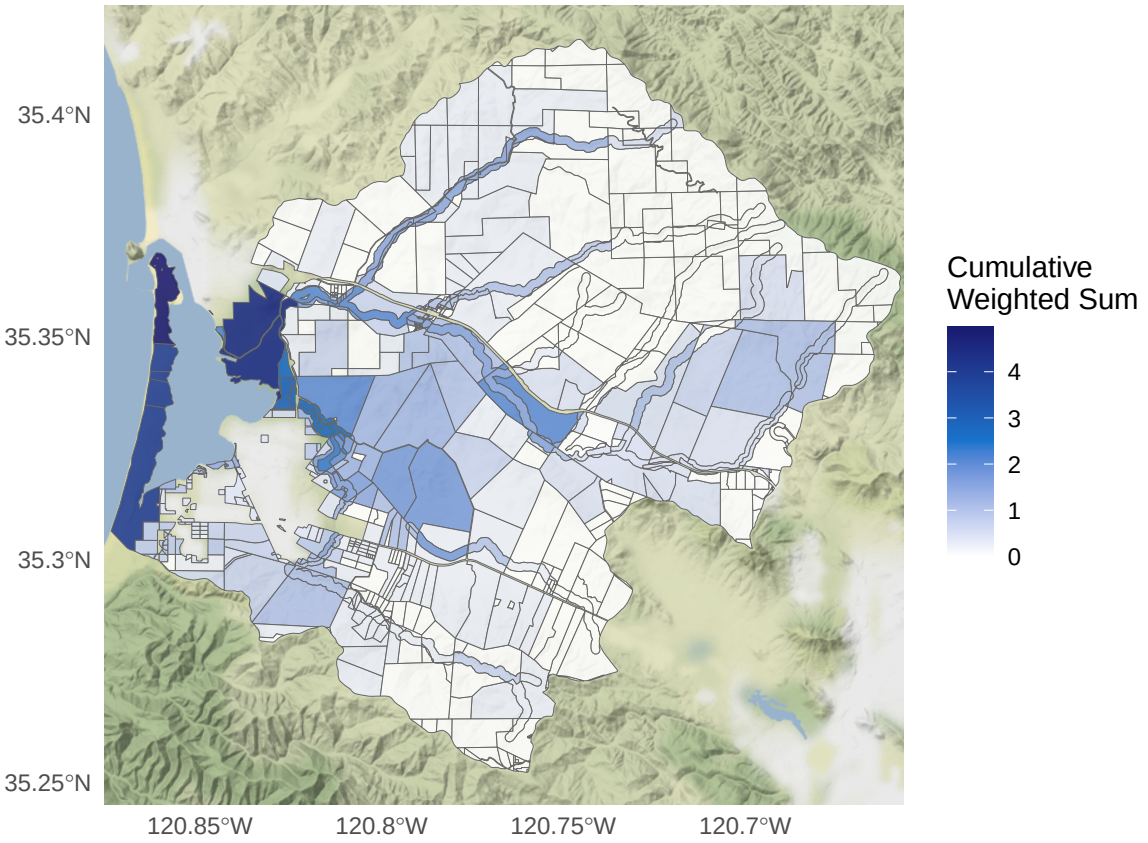
Plot!

```
ggplot(data = shp_weight) +
  geom_sf(aes(fill = cum_sum),
          color = "white",
          size = 0.05) +
  scale_fill_continuous(low = "slategray2",
                        high = "navy") +
  labs(fill = "Cumulative \nWeighted Sum") +
  theme_minimal()
```



Visualize with basemap from ggmap

```
# get basemap with ggmaps

morrobay <- get_map(location = c(lon = -120.7665, lat = 35.335),
                    zoom = 12,
                    maptype = "terrain-background",
                    source = "google")

ggmap(morrobay) +
  geom_sf(data = shp_weight,
          aes(fill = cum_sum),
          color = "gray40",
          size = 0.1,
          alpha = 0.87,
          inherit.aes = FALSE) +
  coord_sf(crs = st_crs(4326)) +
  scale_fill_gradientn(colors = c("white", "dodgerblue3", "midnightblue")) +
  labs(fill = "Cumulative \nWeighted Sum",
       x = NULL,
       y = NULL) +
  theme_minimal()
```




```
ggsave("week-8-ahp.png")
```