Loken_HW3

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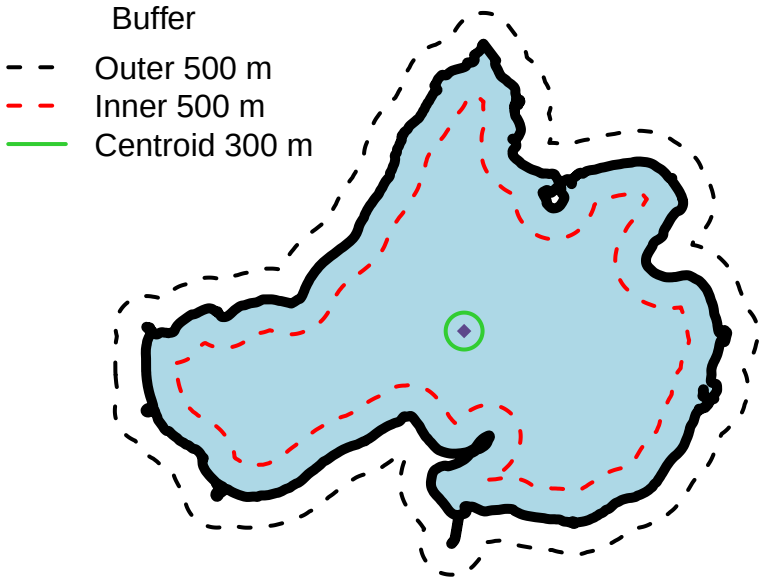
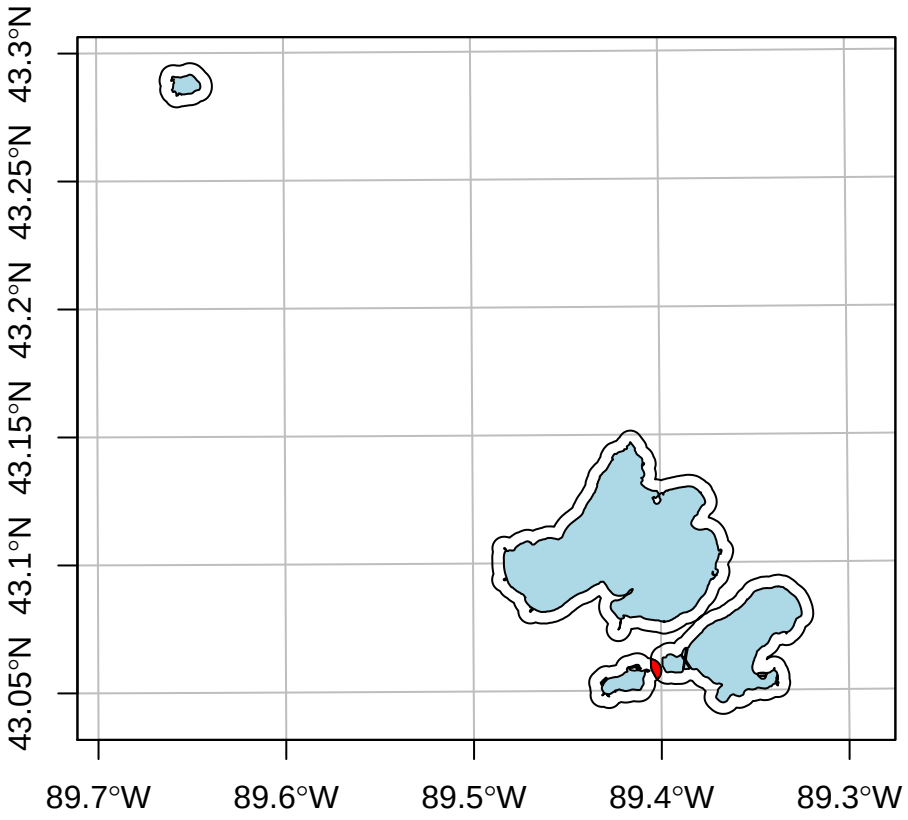
Dear Dr. Dugan:

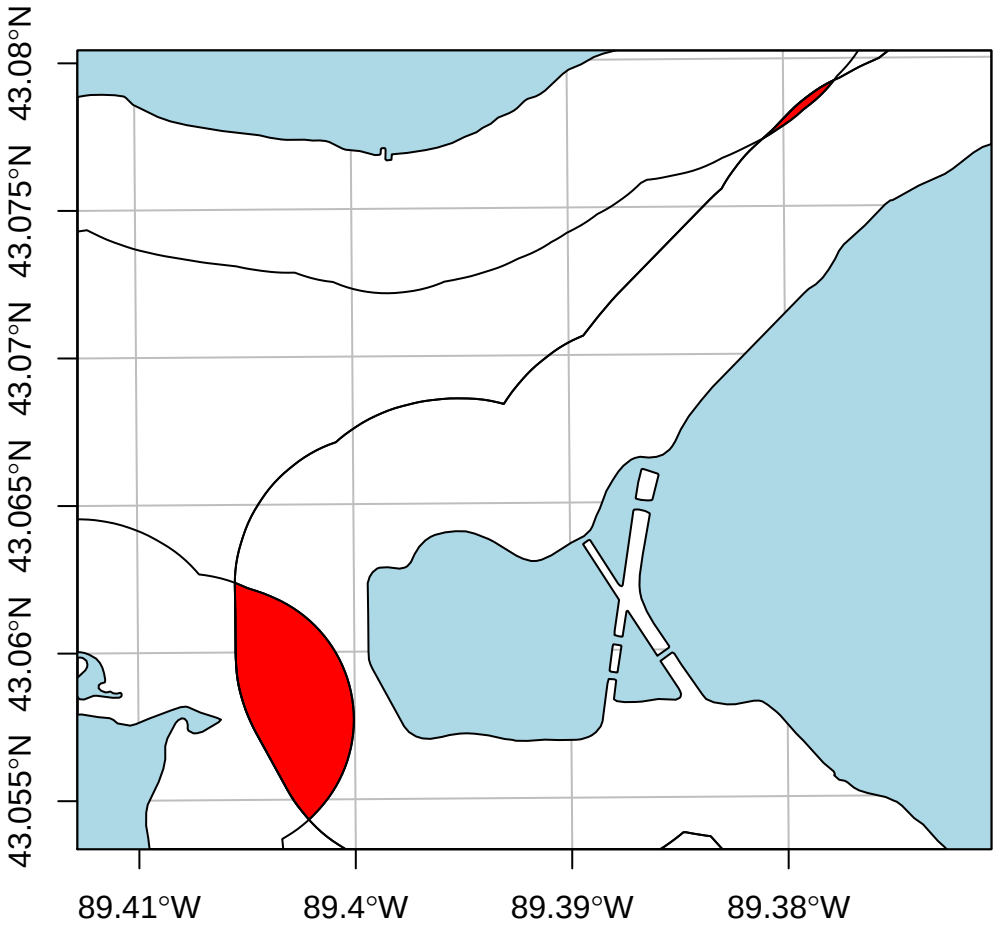
Question 1: What does `st_buffer` do?



`st_buffer` creates a new polygon that all points are X distance away from the edge of another polygon, line or point. The buffer can extend outward (+) or inward (-) of a polygon.

Question 2: Make a 500 m buffer around the 4 southern LTER lakes, which buffers overlap?





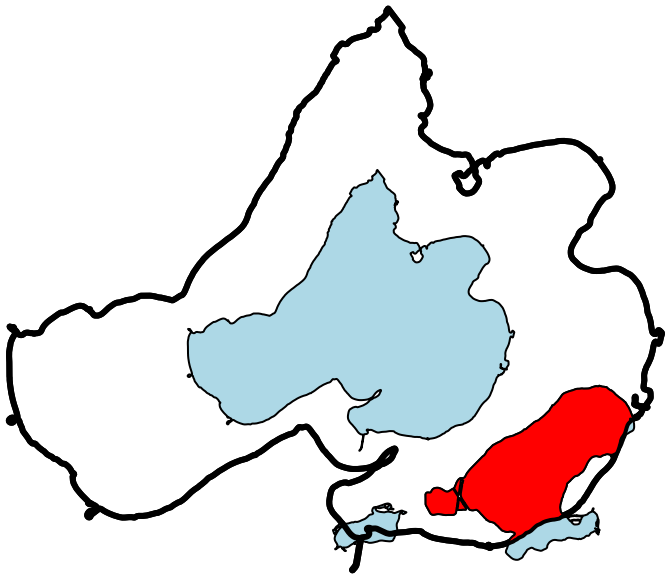
Based on `st_overlaps`, the buffer around Lake Monona (ID#3) overlaps both the Lake Mendota (ID#2) and Lake Wingra (ID#4) buffers. No other polygons overlap.

```
overlaps<-st_overlaps(Lakes_sf500)
names(overlaps)<-Lakes_sf500$LAKE_NAME
str(overlaps)
```

```
## List of 4
##  $ Fish Lake   : int(0)
##  $ Lake Mendota: int 3
##  $ Lake Monona : int [1:2] 2 4
##  $ Lake Wingra : int 3
##  - attr(*, "predicate")= chr "overlaps"
##  - attr(*, "region.id")= chr [1:4] "1" "2" "3" "4"
##  - attr(*, "ncol")= int 4
##  - attr(*, "class")= chr "sgbp"
```

Question 3: Increase the size of the lakes by 2x, What percent of Mendota overlaps with Monona?

```
ME_centroid<-st_centroid(ME)
ME_points<-st_cast(ME, "POINT")

x<-st_coordinates(ME_points)[,1]
y<-st_coordinates(ME_points)[,2]

x2<-2*x-st_coordinates(ME_centroid)[,1]
y2<-2*y-st_coordinates(ME_centroid)[,2]

ME_points2<-st_multipoint(as.matrix(data.frame(x2, y2)))
ME_points3<-st_sfc(ME_points2)

ME_Lines<-st_multilinestring(ME_points3)
ME_Polygon<-st_polygonize(ME_Lines)

ME_Polygon2<-st_geometry(ME_Polygon, type = 3)
st_crs(ME_Polygon2) <- st_crs(ME)
overlap<-st_intersection(ME_Polygon2, MO)
```



```
overlap_area<-st_area(overlap)
BigMendota_area<-st_area(ME_Polygon2)
as.numeric(overlap_area/BigMendota_area)
```

```
## [1] 0.07484969
```

7.45% of the expanded Lake Mendota polygon overlaps Lake Monona.