Part I

1. Under the primary productivity hypothesis, there would be a positive correlation between the population densities and growth rates of the trophic levels (fir/moose/wolves) in Isle Royale because as the fir population goes up, so do the moose and wolf populations because the moose feed on the fir, and in turn the wolves feed on the moose.

2. Under the trophic cascade hypothesis, there would be varying correlations. Changes in one trophic level are caused by opposite changes in the trophic level immediately above it. For instance, if there was an increase in the moose population, then there would be a decrease in the fir population. Or if there was a decrease in the wolf population, there would be an increase in the moose population.

3. Under both hypothesis, a decrease/removal of the wolf population would result in an increase in the moose population, which would then in turn cause a decrease in the fir population, as there would be more moose to feed on the fir.

4. Regarding the measurement of growth rates in balsam fir, the article assumes that fir growth rates would be constant across the islands if the moose population wasn’t present. Regarding the long-term impacts of moose herbivory on balsam fir, the article assumes that moose are responsible for the decline of fir on Isle Royale because nearby islands that are inaccessible to moose continue to have a large fir component in their forests. These assumptions do seem rather plausible considering that moose are the only difference between the islands.

Part II

1. I’m not completely sure what evapotranspiration means, so that would constitute an unclear term. However, the purpose of the figures includes breaking down population density for climate on each side of the island, the ring widths for each side of the island, and the AET to determine the water availability as a function of temperature and rainfall.

2. The ring width has a positive relationship with the moose population density because the ring width is used to measure how much balsam fir there is on the island. So, as the ring width increases, the moose population also increases. Additionally, as the fir population decreases, so does the moose population. On the chart, it appears to have an inverse relationship because each relationship takes time to completely develop. This supports the primary productivity hypothesis because as one population increases, so does the other.

3. The fir populations in the east and west do not respond the same way to changes in moose density. According to the charts, the fir in the west appears to be high as the moose population is low, indicating an inverse relationship. However, the fir in the east has a positive relationship with the moose density and appears to be high when the moose population is high.

4. The maxima and minima of the moose occur directly after the maxima and minima of the wolves, thus indicating that the moose population is directly affected by the wolf population. An abundance of wolves results in a decrease in the moose population, while a decrease in the wolf population results in an increase in the moose population.

5. The data on the annual AET seems to support the trophic cascade hypothesis because the AET data does not appear to be consistent with the fir (east and west) data on the charts provided. The primary productivity hypothesis suggests that plant growth is limited by the energy available to plants, which is determined by temperature and precipitation. The AET represents water availability as a function of temperature and rainfall. Therefore, if the AET data were to support the primary productivity hypothesis, it would need to be consistent with the fir (east and west) data which it does not appear to be.

Part III

1. I am really having trouble understanding what the charts are supposed to represent. The captions don’t seem to make any sense.

2. The trees at the RH location grew in height following the peak of the moose population. In contrast, the trees at the SS location decreased in height following the peak of the moose population. No, the results for these samples are not surprising because the data sets on the previous page indicated that the fir in the west had an inverse relationship with the moose population.

3. The lack in canopy cover increases the growth rates because the fir is more exposed to the sun which provides nutrients. The height of the trees in the RH location will affect their response to changes in primary productivity by making it harder for the moose, who can only browse as high as 3 m, to eat the trees. The height of the trees in the SS location will affect their response to changes in primary productivity by making it easier for the moose to eat the trees since they decreased in height. Figure B appears to support the increase of primary productivity in the late 1970’s-1980’s because the ring width is extremely low which in turn means the fir population is low, which could be caused by the temperature and precipitation.

4. I feel the primary productivity hypothesis is best supported by the ring width chronologies shown in the charts above.

5. Control appears to be exerted from the top down, as suggested by the trophic cascade model. The wolf population influences the moose population which then influences the fir population. However, interactions between trophic levels could also be controlled by primary productivity (canopy cover, temperature, rainfall, access to sun, etc.) which all have an affect on the moose population.

6. One possible experiment could test the affects of canopy cover on the fir population, which would then in turn show the affects on the moose population. Canopy cover is affected by the AET, which would measure temperature and rainfall. An experimental approach may be advantageous because of the manipulation the experimenter has over the variables he/she chooses to use. The experimenter could also choose to slightly vary what is being tested, which would allow for maximum understanding of the topic.