

AN ECOLOGICAL SURVEY AND FLORA OF
LAKE KNOX

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This is a first report of an ecological survey being conducted on a small area containing a pond and a swamp, near the eastern limit of Galesburg, Illinois. This work was begun late in the fall of 1921 in conjunction with a zoological survey by Miss Florence Adcock, which was published in the last year's proceedings of this organization.

The lake lies in a triangular area formed by two embankments of cinders and rubbish. These embankments lie, one parallel to and the other at right angles with the axis of the broad ravine between the surrounding low hills. The lake itself is roughly triangular in shape, being 380 ft. long and 210 ft. wide at the east end.

Lake Knox originated about forty years ago, and until about 1911 was used to supply water to a nearby brickyard. Until it was abandoned, it was kept clear of any great amount of plant life.

The marsh lies directly east of the lake, across the embankment. The marsh area is about 200 ft. square and receives most of its water supply from Lake Knox. The development here has been rather rapid. I can remember fishing here about six years ago.

The main volume of water entering the lake comes through a creek from a similar lake to the south. A nearby spring also contributes its water. The overflow drains eastward into the marsh through two drains, the more recent of which caused the lowering of the lake by about eight inches. Except for the spring deluge and an occasional summer drouth, this area has a fairly constant and abundant water supply.

This region has been used for years as collecting ground for both Knox College and the High School Biology departments. It furnishes frogs, fish, turtles, snakes, crayfish, snails, a few bivalves and numerous protozoans, such as paramecia, vorticella, euglena and amoeba. Filamentous water plants and weeds have been collected here also.

Map of surveyed area.

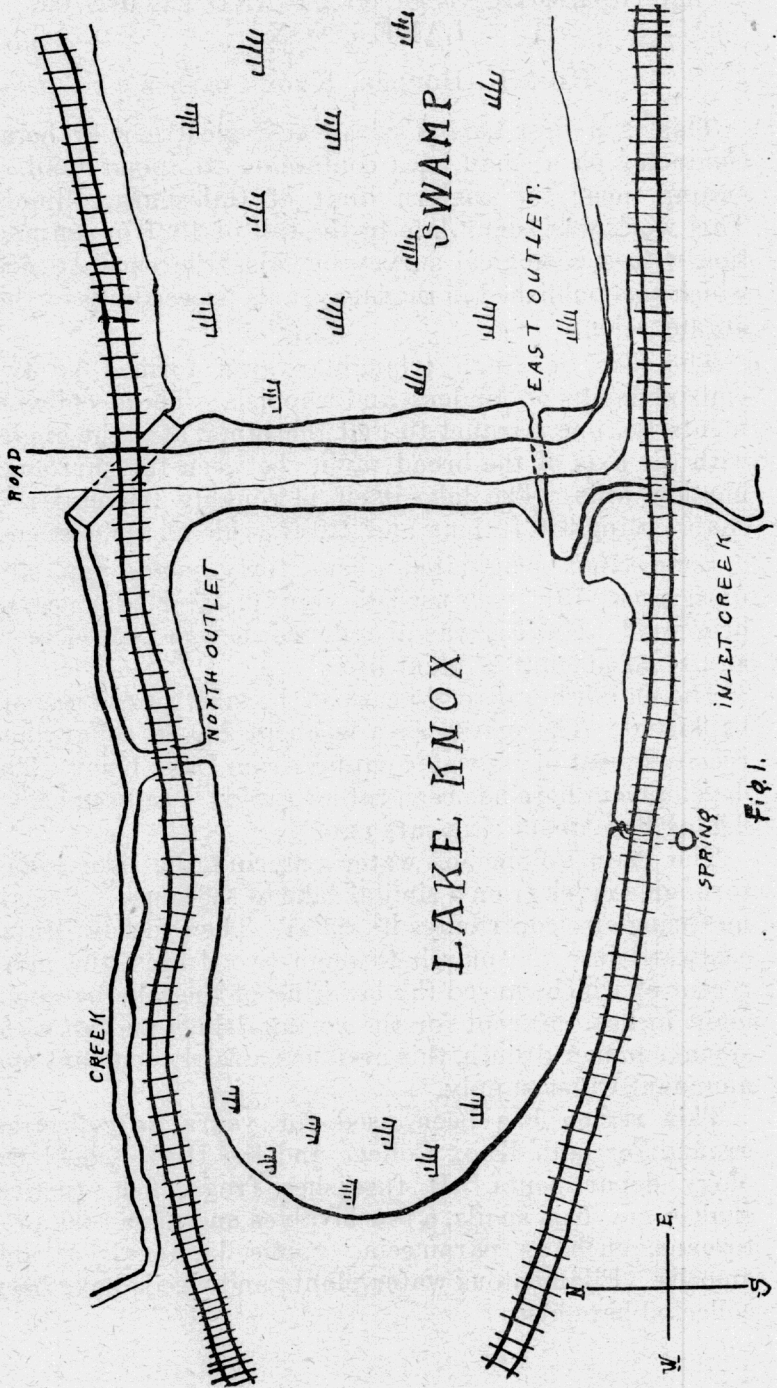
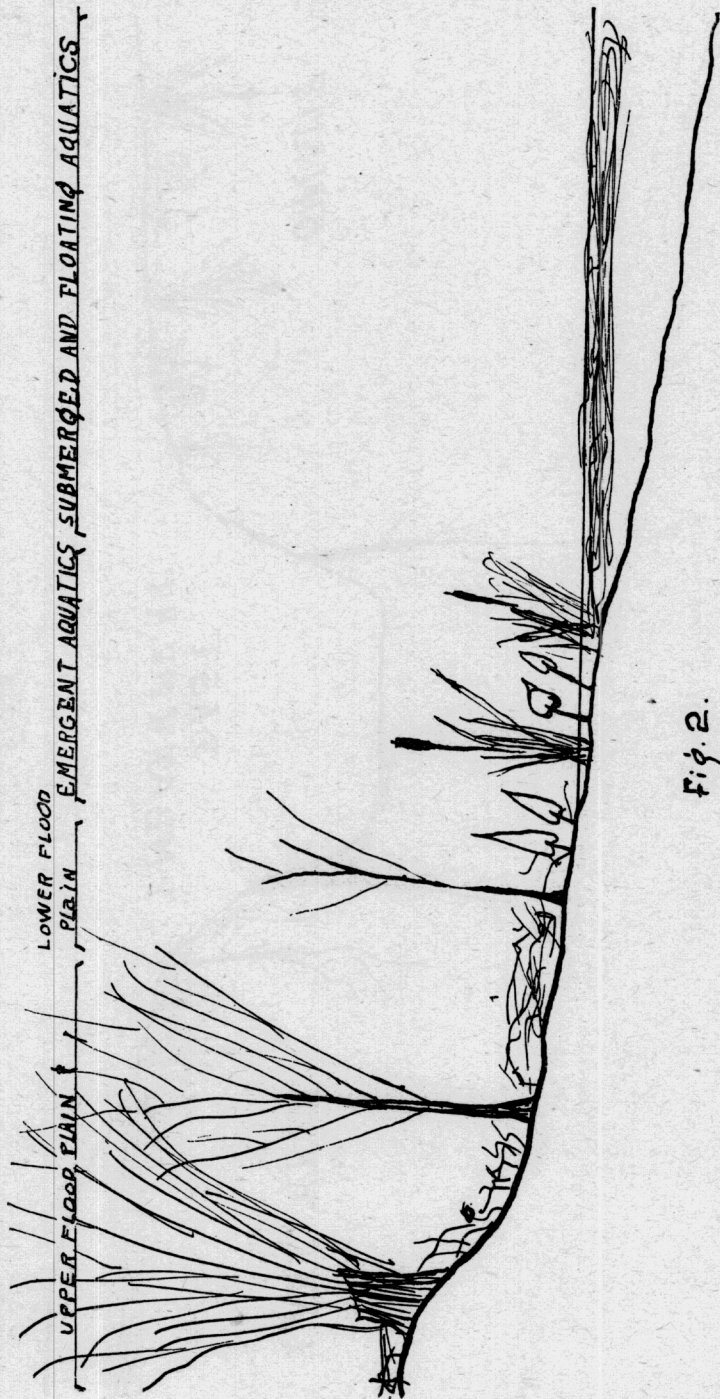


Fig. 1.

Societies of west shore line.



Elevation of east end of lake and swamp.

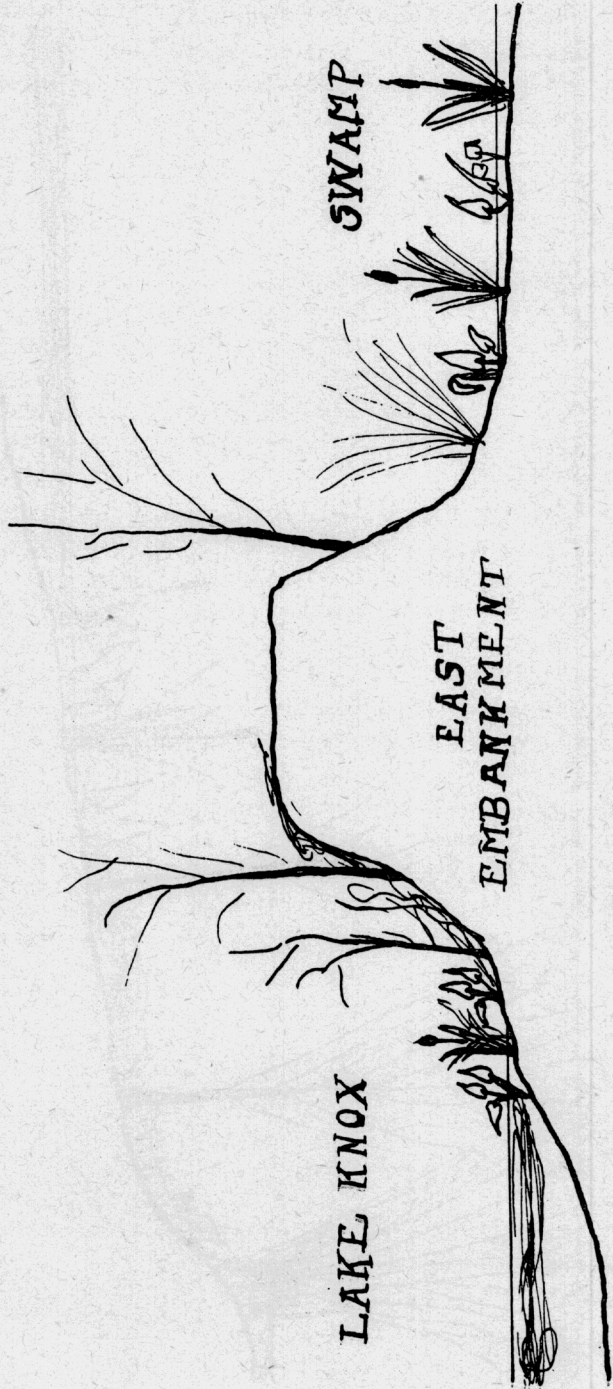


Fig 3.

Indications point to the fact that this lake is filling up: the narrowing circles of willows of different ages, the receding of the shore line on the west end, the great abundance of aquatic plants even near the center, and last year, a stranded group of cat-tails near the northwest corner are signs of the developmental process that is being carried on. Each season's crop of foliage is packed down on the succeeding layer. The inlet is bringing in constantly its contribution of silt and humus which is caught by the filamentous forms and roots of the hydrophytes or allowed to settle in the quiet regions of the center and west end. In collecting material for this survey, we have established stations in most of the typical regions and have attempted to confine our more intensive study to these smaller areas.

In the study of the filamentous forms of this area, some material was brought into the laboratory and after the forms were identified, it was allowed to stand undisturbed; in a short time, another form (hydrodictyon) appeared that had not been seen in the material when it had first been examined. This form had developed in the aquaria under conditions very different from those in the pond but had existed there in limited quantities under the unfavorable conditions. It is thought possible that this method of development under conditions different from those of the pond may lead to the discovery of some forms whose development is limited in the pond, or it may lead to some information on the conditions necessary for maximum development and possibilities for growth under unfavorable conditions.

In the more rapidly developing portions, it is possible to make out the following stages; submerged aquatics, floating aquatics, emergent aquatics, swamp society, and finally those of a river flood plain. If the pond is left undisturbed, it will all pass through the above stages. The plants of each stage prepare the way for those of the next one, and in doing so make conditions impossible for their own existence in that particular area.

In the submerged aquatic society, we find two types; first the free floating, largely made up of desmids and diatoms of the following types, *Scenodesmus*, *Clasterium*,

Denticula, Navicula and Asterionella. The second type is that of the filamentous and attached forms, of which the most abundant species are *Spyrogyra*, *Oedogonium*, *Oscillatoria*, *Cladophera*, *Elodea* and *Ceratophyllum*. The floating leaved aquatics are rather poorly represented, only two species, *Lemna minor* and *Wolffia columbiana*, being found.

The vegetation in the swamp is predominated by *Typha latifolia*, *Sagittaria latifolia*, and *Juncus effusus*. The most typical swamp vegetation is in the area east of the pond. The lake was without this stage a year ago because of the permanent lowering of the water two years ago, leaving the plants of this society in conditions such as to make their development impossible. This society developed on the crescent shaped area at the west end exposed by the receding water and on a narrow strip on the steeper slope at the west end.

Another hydrophyte, water cress (*Radicula Nasturtium aquaticum*), is found in great abundance in the spring fed creek into which flows the north outlet from the lake. It is found only above, never below, the point where the lake drainage enters the stream; so we may understand that the water in the lake is very different from spring water.

The next stage is that of the terrestrial types, which are divided into the lower flood plain group, growing in soil that is saturated continually, and the upper flood plain group, growing in soil that is always moist but not saturated. These names are used because the development of a pond beyond the aquatic stage is very similar to that of a river flood plain. The lower flood plain society is best illustrated at the outer edge of the low area at the west end of the pond. The most notable species are *Polygonum hydropiper* (water smart-weed), *Centricus carolinianus* (sand bur), *Xanthium spinosum* (cockle bur), *Ambrosia trifida* (great ragweed), *Bidens frondosa* (beggar tick), *Taraxacum officinale* (dandelion), *Nepta cataria* (catnip), *Arcetium minus* (burdock), *Salix alba* (white willow), *Postinaca stiva* (wild parsnip), *Oenothera biennis* (evening primrose), *Carex conjuncta*, and *Equisetum arvense* (horse tail).

The upper flood plain is found in a narrow band on the east and north banks and at the west end. This area is rather wider than would be expected because when the pond was lowered, this society advanced and the outer boundary, owing to the adaptability of the species, remained the same. The species that characterize this society are, *Ambrosia trifida* (great ragweed), *Arctium minus* (burdock), *Ulmus americans* (elm), *Salix longifolia* (sand bar willow), *Populus deltoides* (cottonwood), *Avena sativa* (oat), *Taraxacum officinale* (dandelion), *Trifolium repans* (white clover), *Nepta cartaria* (catnip), *Lepidium capsella*, *Lactuca integrata* (wild lettuce), *Trifolium pratense* (red clover), *Plantago rugelii* (plantain), *Salix alba* (white willow), *Asclepias syriaca* (milkweed), *Tradescantia virginiana* (spiderwort), *Postinaca sativa* (wild parsnip), *Cercium lanceolatum* (common thistle), *Poa pratensis* (Kentucky blue grass), and *Horedoum jaubatum* (wild barley). The willows and elm trees at the west end are scrubs, but around the steeper banks on the east and north sides we find seedling cottonwoods and willows about three to five years old.

Lake Knox is an artificial pond. The banks on three sides are composed of rubbish and ashes dumped there when it was formed. On the south embankment, the railroad company periodically dumps ashes and cinders on the lake side. These layers have a very disastrous effect upon the vegetation on the bank and in the water. These cinder patches on the bottom of the pond give no foothold for the emergent aquatics. The few more hardy terrestrial types that are able to exist under these conditions are sand bur, smartweed, burdock, and if the bank is not disturbed in the spring, the great ragweed. Six sand bar willows and an elm have been struggling for several years to keep above the cinders. Only last month, the Street Railway Company dumped two or three car loads of brick and sand on the bank and into the pond at the north east corner. A scrub willow growing there is surrounded completely by about 12 inches of this material and the small willows near by have been obliterated.

The inhabitants of near-by dwellings also use the pond as a dump. It is not uncommon to find all sorts of debris when raking up material for laboratory examination.

The region that is of most interest to the ecologist is not that in which he finds one stage predominant. His real interest is in the contested ground, "no plants land" as it were. In the interzonal areas the conditions are such as to permit the development of species from the two zones on either side of it. No species or type can, however, predominate because of the presence of the other and the conditions that do not favor maximum development. No more valiant fight ever was staged on battlefield or gridiron than is being fought every year in these regions. The receding species do not give up easily; they contest every inch.

The arrow head, because of its adaptibility, is one of the more aggressive types. It seems to defy the deep water on one side and the smartweed on the other. Each spring during the flood period, it takes a grip on part of the lower flood plain and when the water recedes, it remains. The sand bar willow is struggling for a foothold on the lower flood plain. Last season a row of seedlings were established on the west end of the south side. This spring they are on the water's edge and a few are partially submerged. This season will determine whether or not the year old seedlings can survive such conditions even temporarily. Last year, a few willow sprouts were seen on the edge of a partially submerged row boat near the west end of the lake. This spring, there is no sign to indicate that they have survived. So the struggle goes on, the plants slowly changing the conditions of the area and the conditions determining the plants that shall survive.

IN CONCLUSION

Lake Knox, an artificial pond, was abandoned several years ago and, with the exception of man's influence mentioned, nature was allowed to take her course. At the present time, the lake is being filled in slowly with the silt and humus carried in by the inlet and the humus formed by the plants that live within and around its borders. Here we have a striking example of nature's developmental changes within a limited area.