

## ISLE ROYALE MOOSE STUDIES

SLIDE 1. Map of Michigan showing location of Isle Royale

Situated in the north central part of Lake Superior some thirteen to eighteen miles from the Canadian shore and about forty-five miles northwest of Keweenaw Point, the northernmost part of the upper peninsula of Michigan, is Isle Royale.

SLIDE 2. View northwest from Mt. Franklin near the eastern end of Isle Royale. Showing mixed stands of birch-poplar-balsam with spruce swamps in the valleys.

Its folded Pre-Cambrian strata of volcanic origin have been faulted into series of ~~major and~~ major and minor ridges with high escarpments to the north and moderate slopes to south. Spruce, cedar, balsam fir, <sup>and</sup> alder, etc. are found in the wet valleys around the numerous lakes, and bogs with leatherleaf, Labrador tea, and sphagnum are common. Poplar, birch, and balsam fir cover much or most of the upland areas, but bare rock is often exposed on the tops of ridges. 2.

SLIDE 3. Ground hemlock on Wright's Island, in Siskiwit Bay. This island is one mile offshore, about three hundred acres in area and little frequented by moose.

Ground hemlock, which at one time formed dense tangles over wide areas, is now found on outlying islands, but is notably absent from the main island due probably to moose browsing. Fire scars of various ages are evident in many places and have had a marked effect on the forest growth. 3

SLIDE 4. Pressure ice offshore from Chippewa Harbor in late February.

~~SLIDE 5. Ice ramparts on shore in the same place.~~

~~These views indicate the difficulties moose might encounter going to or from the island on the ice.~~

Numerous investigators have explored and written about the geology, vegetation, and animal life of the island over the past hundred years, but moose were not reported until about 1914, and it seems generally accepted that they came from Canada in the winter of 1912-13 when exceptionally severe weather formed ice solidly to the Canadian shore, although this matter is open to question. • 4 • 5

PAUSE TO DISCUSS SLIDE 4. and 5.

SLIDE 5. Ice ramparts on shore near Chippewa Harbor.

These views indicate the difficulties moose might encounter going to or from the island on the ice. Ice seldom freezes solidly more than a few miles out, and is constantly breaking up and reforming.

We know that shortly moose became common enough for estimates of 200 to be made in 1915, 300 in 1918, 1000 in 1922, and so plentiful were they in 1928 that estimates varying from 1000 to 5000 were made. These figures are open to considerable criticism, but indicate with surety a steady increase in the herd up to about 1929. At that time a moose problem was predicted by many investigators.

SLIDE 6. Calf moose found dead near Chippewa Harbor. Autopsy revealed nothing but malnutrition as the cause of death.

a crisis would arise was biologically inevitable, because the moose were

to a restricted area and no predators were present that could check their



increase. Obviously, if disease did not check them the shortage of food must, and such proved to be the case. The herd has been rapidly declining from about 1933 to the <sup>spring 1935</sup> ~~present~~ time when four to five hundred animals <sup>are</sup> ~~are~~ estimated. <sup>was</sup> ~~present~~

SLIDE 7. Balsams dead of spruce bud-worm infection. Near Lake Whittlessey on south side of island.

Another factor served to make matters worse for about 1929 the spruce bud-worm severely attacked the balsam fir, the most important winter food of the moose on Isle Royale. <sup>For</sup> ~~Already~~ feeding conditions were further aggravated by this insect pest which spread so rapidly that over wide areas in 1935, 90 to 100% of the balsams that would project above the snow in winter were dead. Most solid stands of balsam, of which there are many are now a desolation. So many moose were found dead in the spring of 1934, that the Department of Conservation of Michigan determined to make a thorough investigation of the health of the herd, and of the possibilities of live-trapping and transporting moose, as well as emergency feeding. An assistant and I were delegated to this task and arrived on Isle Royale in November 1934, to spend the winter.

SLIDE 8. A stand of balsams about 25 years old near Todd Cove on north central part of the island. This condition is fairly typical of this type of cover.

Shooting, if started soon enough, would have been the simplest method of holding the moose in check, but funds were not available for state-paid hunters,

and public opinion was opposed, because the facts about food shortage on Isle Royale which were so apparent to game men and biologists as early as 1929, were vigorously denied by many laymen familiar with the island only in the summer, and the Department of Conservation was suspected of wishing to open a hunting season on moose. ● 8 ? ● 9 ?

SLIDE 9. Overbrowsed willow near Todd Cove, growing on a recent "burn". Other deciduous plants were browsed as heavily in this and other areas.

The Department was not anxious to conduct such a season because of the many difficulties involved, and ~~could~~ <sup>could</sup> not because moose were, and still are, given complete protection from hunting by legislative action.

SLIDE 10. Stand of poplars near McCargoe's Cove. Fresh eating of poplar bark is seen here on Jan. 5. At this time of year the bark clings tightly and it is easy to distinguish gnawing at this time of year from that done in the spring.

Our field investigations during the winter showed that the moose were traveling about quite extensively for forage. Mute signs of their all but futile search for food were frequently seen where their tracks in the snow showed they had circled small balsams, already browsed above their reach, then passed on to nibble the shoots of birch, alder, or ash, possibly take a bite or two of dry browse from a fallen balsam, or pause to eat white cedar along the lake shore where drifted snow made traveling all the harder. Poplars with teeth marks of moose plainly showing, unlike the bark stripping that normally takes place in the spring, were found in mid-January.



SLIDE 11. White pine on a high ridge above McCargoe's Cove. This condition of browsing on pines is common. Moose accept pine and cedar as second choices only, and much prefer balsam fir. Coffman (right) Vint(left) Allen(left) ✓

Moose care little for white cedar or white pine, but both are badly browsed. PAUSE ● 11

TO DISCUSS ABOVE SLIDE.

SLIDE 12. Dead bull at Chippewa Harbor. This bull died in mid-Feb. 1935. It lingered around the dwellings for several days in a very weak condition and finally died.

Dead and dying moose were frequently found lying ~~and~~ in the heavy snow along the lake shores, from January until spring. Twenty-four autopsies by Dr. Don R. Coburn, Game Division Pathologist, have revealed little but malnutrition as the cause of death. The ingestion of unsuitable food appeared to cause a poisoning as evidenced by the abnormal formation of red blood cells in the bone marrow.

Heavy infestation of ticks on a bull moose which was shot. This animal was anemic and had verminous pneumonia.

Heavy infestations of ticks were found on most of the moose, but no pathogenic organism was demonstrated in them and captive moose showed no ill effects from these parasites, save the loss of hair caused by rubbing. ● 13 ● 14

SLIDE 14. Captive moose in April 1935. All these animals were heavily infested with ticks but were in good physical condition despite their ragged appearance. ● Dismiss

One calf we found dead was probably killed by coyotes, but no one can say as to its health and vigor, and three other dead calves were found unmolested, hence predation is probably not of major importance. Forty dead moose were accounted for in the spring of 1934, and twenty more were found in the winter and spring of 1935.

SLIDE 15. Box trap used to capture moose. Sixteen feet long, seven feet high, and five feet wide. Made of inch pine boards. The moose did not fight the trap at all. It was also used in crating operations.

Our attempt to live-trap and transport moose to the upper peninsula of Michigan from the island was successful. A single box trap captured twelve animals, while a drop gate set in a corral fence accounted for four more. One died, two escaped from our corrals, while two others were released because we did not wish to keep too many in small corrals. Seven cows, four calves, and five bulls were trapped.

SLIDE 16. Men moving crate with moose inside from trap to dock for shipment to the mainland of Michigan. Chippewa Harbor, May 1935.

Nine of our eleven captive animals were crated in the spring as soon as navigation opened and shipped to a suitable area in the upper peninsula of Michigan. The other two were sent to the Detroit Zoological Park. Reports received during the past summer and fall indicated those we released were doing well. It was rumored that one was shot by a hack-woodsman, but this is not definite. However, poaching is a



significant factor in such a restocking program, and to overcome this the Michigan Department of Conservation is again trapping moose on Isle Royale this winter in the hopes of establishing an adequate breeding stock of about forty animals in each of two areas in upper Michigan. The National Park Service has kindly given acquiescence to this program, as well as support from its CCC camp which was on Isle Royale last summer.

SLIDE 17. Balsam browse being fed in corrals. About 100 pounds. This picture shows also the soy bean-molasses mixture obtained from the New York Department of Conservation. The moose relished this when it softened up in warm weather, but had to learn to like it. At first they ignored it.

During the winter captive animals were fed on balsam, birch, and poplar browse, alfalfa hay, and a variety of grains. PAUSE TO DISCUSS 17 and 18. ● 17 ● 18

SLIDE 18. Poplar browse. Moose will eat about two-thirds of this, and are quite fond of it.

Alfalfa hay was not taken readily at first, but later the moose learned to like it, but would touch neither upland hay nor timothy.

SLIDE 19. Alfalfa hay (above) and timothy (below) placed along a drift fence. Moose would not eat either, but did clean up balsam saplings cut and placed along the fence. Possibly if enough alfalfa were made available they might learn to eat it in the wild, but captive moose learn to eat it only after it had been sandwiched into balsam browse.

Alfalfa ~~hay~~ and other hay was placed along drift fences for moose in the wild, but was not eaten, although balsam saplings were, and moose frequently followed lines of felled balsams and birches to the trapping area. Browse was weighed before and after feeding to give the net amount eaten, an average of about twenty-five pounds of mixed balsam and birch browse per moose per day. The amount increased with the size of the animal and the severity of the weather.

SLIDE 20. A three inch birch tree has been felled and the branches trimmed off. The moose eat about a quarter of this. The background shows the type of vegetation on the acre that was cut. Runs about 1500 to acre (balsm, birch, & poplar)

Studies of emergency feeding consisted of measuring off and cutting one acre of fairly typical birch-poplar-balsam cover. The browse was trimmed off and weighed, then fed to our captive animals. Our figures indicated that about two tons of suitable feed could be obtained, <sup>from an acre</sup> which amount would feed one moose about seventy-five days. 20 21

PAUSE TO DISCUSS 20 and 21.

If it seemed desirable SLIDE 21. A three inch balsam sapling with dry branches on the left and green on right. This tree yielded about five pounds of edible browse.

If it seemed desirable to manage the island for the maximum number of moose, our rough computations, little better than guesses, would indicate that considering the relative areas of different cover types and the present browsed out condition of the vegetation, about a thousand moose could be maintained on a forty year



rotation plan, if food alone were to be considered.

SLIDE 22. Solid balsam stand on Todd Cove. Apparently these trees had grown enough before the moose became too abundant so that they escaped destruction by overbrowsing. The age of this stand is about forty years.

Obviously, to sacrifice other wildlife values for the moose would seem undesirable, but just what sacrifices should be made for them? Without management probably less than half as many moose could be permanently maintained as with it. It is not within the scope of this paper to consider all the intricate ramifications of such a problem, but with further study and refinement along such quantitative lines, sufficiently reliable figures might be obtained which would afford a working basis for moose management.

*Additional information to supplement last years work is being secured by the party now on the island. The 47 captured animals are being transported to the mainland for release.*

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(Presented at the North American Wildlife Conference, February 3-7, 1936,

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*While Hickie and Cotnam have not been able to summarize this winter experience nothing new has arisen so far as I know.*