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FALL PROGRESS REPORT
OF THE
RESEARCH PROJECT
ENTITLED
THE FLORA AND VEGETATION ECOLOGY
OF ISLE ROYALE NATIONAL PARK

SUBMITTED FALL, 1981

BY

ROBERT A. JANKE

CHIEF INVESTIGATOR

GENERAL OBJECTIVES

FIELD WORK DURING THE SUMMER OF 1981 CENTERED AROUND 2 MAJOR OBJECTIVES. ONE OF THESE WAS TO BEGIN A STUDY COMPARING THREE POST-FIRE FOREST TYPES IN THE BOREAL FOREST REGIONS OF ISLE ROYALE NATIONAL PARK. THE THREE TYPES TO BE STUDIED WERE THOSE DOMINATED BY WHITE BIRCH (BETULA PAPYRIFERA) THOSE DOMINATED BY QUAKING ASPEN (POPULUS TREMULOIDES) AND THOSE DOMINATED BY JACK PINE (PINUS BANKSIANA). THIS STUDY INVOLVES A COMPARISON OF HABITAT PREFERENCES AND OF FOREST ATTRIBUTES CHARACTERISTIC OF THESE THREE FOREST TYPES.

THE OTHER MAJOR OBJECTIVE WAS TO CONTINUE OUR ISLE ROYALE FLORA PROJECT. THIS PROJECT CONSISTS OF INVENTORYING ALL OF THE VASCULAR PLANTS OF THE PARK, ESTIMATING THEIR RELATIVE ABUNDANCE, AND DETERMINING THEIR HABITAT PREFERENCES.

LOGISTICS

THIS YEAR'S PHASE OF OUR RESEARCH PROJECT BEGAN IN LATE SPRING WITH THE PURCHASE OF SUPPLIES AND EQUIPMENT AND THE HIRING OF ASSISTANTS FOR THE SUMMER FIELD SEASON. ON MAY 27 I TRAVELED TO ISLE ROYALE VIA RANGER III TO BEGIN THE FIELD SEASON. DURING THE NEXT THREE WEEKS I LOOKED FOR SUITABLE STUDY AREAS FOR THE POST-FIRE FOREST-TYPE STUDY AND ENGAGED IN FIELD WORK ASSOCIATED WITH THE FLORA PROJECT.

ON JUNE 16 MY FIELD ASSISTANTS ARRIVED ON ISLE ROYALE VIA RANGER III. THE CREW, ALL STUDENTS OF MICHIGAN TECHNOLOGICAL UNIVERSITY, CONSISTED OF: (1) DARCY RUTKOWSKI, ONE OF MY GRAD-

UATE STUDENTS HIRED UNDER PROJECT FUNDS FOR WHOM THE SUMMER FIELD WORK WOULD BECOME THE BASIS FOR A MASTERS THESIS, (2) HER HUSBAND, ROBERT RUTKOWSKI, ALSO HIRED UNDER PROJECT FUNDS, AND (3) TWO UNDERGRADUATE STUDENTS HIRED UNDER THE FEDERAL WORK-STUDY PROGRAM. DURING THE FOLLOWING WEEK WE SET UP A BASE CAMP AT THE ROCK HARBOR RESEARCH CAMPGROUND AND CARRIED ON A TRAINING PROGRAM INVOLVING ACQUAINTING THE CREW WITH THE PLANTS THAT THEY WOULD ENCOUNTER IN VEGETATION SAMPLING, THE SAMPLING PROCEDURES TO BE USED AND THE PROPER USE OF THE BOAT AND RESEARCH EQUIPMENT. FOLLOWING THIS, APPROXIMATELY TWO WEEKS WERE SPENT LOCATING FOREST STANDS FOR THE POST-FIRE FOREST-TYPE STUDY.

THE REMAINDER OF THE SUMMER WAS SPENT SAMPLING IN THE STANDS SELECTED FOR STUDY AND CONTINUING WORK ON THE FLORA PROJECT. WE BROKE CAMP AT ROCK HARBOR ON AUGUST 28 AND RETURNED TO THE MAINLAND VIA RANGER III ON THE FOLLOWING DAY.

SINCE THE END OF THE FIELD SEASON WE HAVE BEEN ENGAGED IN LABORATORY ANALYSES AND DATA PROCESSING ASSOCIATED WITH THE SUMMER'S FIELD WORK. THE RESULTS OF THIS YEARS WORK WILL BE SUMMARIZED IN OUR ANNUAL YEAR-END REPORT TO BE SUBMITTED TO THE NATIONAL PARK SERVICE IN MAY 1982.

METHODS

POST-FIRE STAND-TYPE STUDY. THIS STUDY WAS CONDUCTED IN AREAS WHICH, BY PREVIOUS RECONNAISSANCE, WERE FOUND TO CONTAIN AN ABUNDANCE OF YOUNG STANDS DOMINATED BY WHITE BIRCH, QUAKING ASPEN, OR JACK PINE. WITHIN THESE AREAS EQUALLY SPACED TRANSECTS WERE FOLLOWED PERPENDICULAR TO THE MAJOR TOPOGRAPHIC FEATURES

OF THE MAIN ISLAND. ANY STAND ENCOUNTERED ALONG THE TRANSECTS IN WHICH THE RELATIVE BASAL AREA OF WHITE BIRCH, QUAKING ASPEN OR JACK PINE WAS AT LEAST 70% WAS CONSIDERED FOR POSSIBLE STUDY. IN ADDITION, TO MINIMIZE DIFFERENCES DUE TO SUCCESSIONAL STAGES, ONLY STANDS WHICH WERE ESTIMATED TO BE APPROXIMATELY 100 YEARS OF AGE WERE CONSIDERED. THIRTY STANDS OF EACH OF THE THREE TYPES WERE SELECTED FOR THE COMPARISON STUDY.

FOR SAMPLING OF THE TREE STRATUM A 30 X 12 M PLOT WAS RANDOMLY POSITIONED WITHIN EACH STAND WITH THE 30 M SIDE PERPENDICULAR TO THE TRANSECT LINE. THE DIAMETER AT BREAST HEIGHT (D.B.H.) AND SPECIES WERE RECORDED FOR ALL TREES (D.B.H. > 5 CM) WITHIN THE PLOT. ALSO THE NUMBER OF WINDFALL TREES WITH THEIR BASE WITHIN THE PLOT WAS RECORDED. THE HEIGHT AND SPECIES OF ALL SAPLINGS (HEIGHT > 1 M, D.B.H. < 5 CM) WITHIN A 1 M WIDE STRIP ON ONE SIDE OF THE 30 CM LONG CENTER-LINE OF THE TREE PLOT WERE RECORDED. THE PERCENT COVER OF SPECIES WITHIN THE TALL SHRUB STRATUM (HEIGHT > 1 M) WAS DETERMINED BY THE LINE-INTERCEPT METHOD USING 3 RANDOMLY LOCATED LINES PERPENDICULAR TO AND EXTENDING 6 M ON EITHER SIDE OF THE ABOVE MENTIONED TREE PLOT CENTER-LINE. PERCENT COVER OF LOW VASCULAR PLANTS (HEIGHT < 1 M) WAS ESTIMATED IN EACH OF 10 RANDOMLY PLACED 40 X 50 CM RECTANGULAR PLOTS EACH DEMARCATED BY A 40 X 50 CM METAL FRAME. A COMMONLY USED 7 POINT SCALE OF COVER ABUNDANCE WAS USED, NAMELY:

+	=	0-1%
1	=	1-5%
2	=	5-25%
3	=	25-50%
4	=	50-75%
5	=	75-95%
6	=	95-100%

COUNTS OF TREE SEEDLINGS (HEIGHT < 1 M) WERE MADE IN THESE SAME TEN PLOTS. PERCENT COVER OF BRYOPHYTE SPECIES WAS ESTIMATED USING THE SAME SYSTEM AS FOR LOW VASCULAR PLANTS. IN ADDITION THE SUBSTRATA (ROCKS, LITTER, DECAYED WOOD, ETC.) UNDERLYING EACH BRYOPHYTE PATCH WAS NOTED. AS A RELATIVE INDICATOR OF SOIL DEPTH, $\frac{1}{2}$ INCH POINTED STEEL PROBES WERE DRIVEN INTO THE GROUND AT TWO RANDOMLY LOCATED POINTS ON EACH OF THE 3 TALL SHRUB INTERCEPT LINES. THE DEPTH OF PENETRATION TO ROCK WAS MEASURED. MEASUREMENTS OF SOIL LITTER DEPTH AND COLLECTION OF A SOIL SAMPLE OF THE TOP 10 CM OF MINERAL SOIL WERE DONE AT EACH OF 2 RANDOMLY LOCATED POINTS ON THE TWO OUTER SHRUB INTERCEPT LINES. PERCENT COVER OF EXPOSED SURFACE ROCK WAS MEASURED BY THE LINE-INTERCEPT METHOD ALONG THE 3 TALL SHRUB INTERCEPT LINES.

THE SLOPE WAS MEASURED WITH AN INCLINOMETER AND THE ASPECT WITH A COMPASS. THE APPROXIMATE POSITION ON THE SLOPE WAS RECORDED AS UPPER, MIDDLE, OR LOWER. TWO TREES WERE SELECTED THAT APPEARED TO BEST REPRESENT THE POST-FIRE PIONEER TREE INVADERS AND WERE BORED WITH AN INCREMENT BORER.

OUR PREVIOUS OBSERVATIONS ON POST-FIRE STANDS HAVE SUGGESTED THAT WHETHER A BURN IS INVADED BY ASPEN OR BY BIRCH IS LARGELY AFFECTED BY THE FREQUENCY OF FIRES IN THE AREA. TO TEST THIS HYPOTHESIS WE SAMPLED BASAL AREAS OF THESE SPECIES IN PAIRED AREAS OF THE PARK, ONE MEMBER OF THE PAIR HAVING BEEN BURNED ONCE IN THE PAST 180 YEARS AND THE OTHER, ONLY ONCE. OTHERWISE THE AREAS WERE RELATIVELY SIMILAR IN THAT THEY WERE GEOGRAPHICALLY ADJACENT, WERE, ON THE AVERAGE, THE SAME ELEVATION ABOVE LAKE SUPERIOR AND HAD SIMILAR TOPOGRAPHIC POSITION. DECISIONS AS TO

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WHETHER AREAS WERE BURNED ONCE OR TWICE WERE BASED UPON (1) MENTION OF RECENT BURNED AREAS OR AREAS OF "YOUNG GROWTH" IN THE ORIGINAL LAND SURVEY NOTES, (2) NATIONAL PARK SERVICE FIRE RECORDS AND (3) INCREMENT BORING OF TREES. BASAL AREA MEASUREMENTS WITHIN EACH AREA WERE MADE BY USE OF A BITTERLICH PRISM AT RANDOMLY SELECTED POINTS ALONG TRANSECTS PERPENDICULAR TO THE GENERAL DIRECTION OF RIDGES AND VALLEYS OF THE ISLAND.

FLORA PROJECT. WE CONTINUED TO MAKE INVENTORIES OF VASCULAR PLANTS IN AREAS REPRESENTING VARIOUS HABITAT TYPES. IN EACH AREA SELECTED, AN ASSESSMENT OF THE RELATIVE ABUNDANCE OF EACH SPECIES ENCOUNTERED WAS MADE ON A 5-POINT SCALE OF ABUNDANCE RANGING FROM RARE TO VERY ABUNDANT. ALL UNFAMILIAR PLANTS WERE COLLECTED FOR LATER IDENTIFICATION. WE WERE CONTINUALLY ON THE LOOKOUT FOR SPECIES OF PLANTS THAT HAVE NOT YET BEEN RECORDED FOR ISLE ROYALE. IN PARTICULAR WE CONCENTRATED ON AQUATIC AREAS SINCE THESE HAVE BEEN THE LEAST STUDIED.

MISCELLANEOUS ACTIVITIES. WE CONTINUED RECORDING ALL OBSERVATIONS MADE ON THE EFFECTS OF MOOSE AND BEAVER ON THE VEGETATION AS WE TRAVELED THROUGHOUT THE PARK. IN CONNECTION WITH THE POST-FIRE FOREST-TYPE COMPARISON STUDY WE MADE MEASUREMENTS OF HEIGHTS OF ALL SAPLINGS SAMPLED. THE DISTRIBUTION OF SAPLINGS AMONG VARIOUS HEIGHT CLASSES MAY REVEAL INFORMATION ON THE EFFECT OF MOOSE ON THE RECRUITMENT OF TREES OF VARIOUS SPECIES INTO THE FOREST TREE CANOPY.

KODACHROME SLIDES WERE TAKEN THROUGHOUT THE SUMMER OF OUR ACTIVITIES, OUR STUDY SITES AND SPECIES OR ECOLOGICAL PHENOMENA ASSOCIATED WITH OUR RESEARCH PROJECT. ONE COPY OF EACH

WILL BE PRESENTED TO THE SUPERINTENDENT OF ISLE ROYALE NATIONAL
PARK FOR ADMINISTRATIVE OR INTERPRETIVE PURPOSES.