REPORT ON

THE IOWA

TWENTY-FIVE YEAR

CONSERVATION

PLAN

1933

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TWENTY-FIVE YEAR

CONSERVATION PLAN

Prepared for

THE IOWA BOARD OF CONSERVATION

and

THE IOWA FISH AND GAME COMMISSION

by

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1933

THE IOWA CONSERVATION PLAN

A plan and program for the wise human use of Iowa's natural resources.

Dedicated to the men and women whose dreams and labor for true conservation in Iowa now approach fulfillment.

"Let every citizen of Iowa catch and hold that vision of the economy and the enrichment of human living to be achieved only through state-wide, far sighted development plans. Not for too visionary, but for too meager-minded planning shall we be held to account."

FOREWORD

The present period, the second century in the development of Iowa, will see. not the dram* of the occupation and exploitation of the state, but the processes of readjustment of human life to the situation now found here. Governmental, social and economic structures will be nwdffifd and rearranged to serve the needs of the citizenry. The utilization of resources, both material and human, will be placed on a more rational basis. The physical environment will be trans formed from a condition of hasty, thoughtless destruction and upbuilding to a condition far more thoughtfully and carefully created. The beginning of the new period, the post pioneer era, is evident on all sides. Conservation planning is one important manifestation of this wide movement. The trend is toward more fully "civilizing" all aspects of life, including not only the refinement of organization and environment but also the recovery of a reasonable fwfenre between man-made and nature-made elements in the environment.

We do not so soon forget the magnificence of the deep woods and unbroken prairies, nor the fascination of contact with wild creatures, even though our main enterprise is to turn natural resources to practical use. Hence, the planning here undertaken has two phases that dealing with the sound, economic utilization of native resources and that dealing with the preservation of natural features of interest and beauty. Conservation planning is aimed toward order and social economy in the practical use of the land and its treasures, toward order and economy in the process of refining the outdoor setting of Iowa life, toward order and economy in the state's provision for public recreation, and toward the coordination of this work with all the other types of activity which touch upon it. Economy for the taxpayer, good health and greater satisfac tion through outdoor recreation, and the creation of a distinguished and beautiful landscape these purposes require conservation planning.

A brief review of what has taken place in rural Iowa thus far demonstrates the necessity for planning these enterprises for the future: the waste of Iowa's greatest asset, the soil; the unwise destruction of surface waters by drainage, pollution and silting; the heedless stripping of woodlands; the almost wanton destruction of wild life; the irrational use of funds for recreation in several forms; the patent failure to capitalize the state's fine potentialities all along the line. Only *coordinated* planning can fit together these closely inter-related fields.

We believe that this report records the desire of the people of Iowa to exercise forethought through planning. Their first interest just now is to avoid wasting available funds. By es tablishing a long-term schedule of development on which every dollar spent will be well spent, an enormous economy is assured as compared with haphazard, uncorrelated conservation. The Plan is a device to get the people' s money's worth in each phase of the work.

The people of Iowa have for twenty years dreamed of the recovery, development and wise utilization of the woods, lands and waters from which the great wealth of the state is derived. Every element of the Conservation Plan is set forth in response to a strong demand from thou sands or hundreds of thousands of citizens. This report is issued, therefore, to advise on the manner in which the things they want may be crystallized into a feasible, economic program which can be actually realized.

The fact that most Iowans desire for their state the developments which the Conservation Plan includes has made it feasible to draw on assistance from hundreds of individuals and organizations, official and otherwise. Without this help it would not have been possible to cover the wide field of conservation within the limited time and funds available. Grateful acknowl edgement of this widespread assistance is hereby set down; and its utmost importance to the project is recognized.

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A SUMMARY OF THE RECOMMENDATIONS

ON

THE IOWA CONSERVATION PLAN

State government in Iowa, as in the other states, was organized to meet those needs of the people which cannot be satisfactorily fulfilled by private or local initiative. And the functions of the state have broadened and will con tinue to broaden with the increasing complexity of civilized living.

First of all government itself was set up, with its executive, legislative and judicial branches; local power was delegated to the state's political subdivisions: counties, townships and municipalities. And public regulation of private activity has been expanded to give greater protection and security for the common wel fare. The educational system follows, a second great enterprise of the people ex pressing their will through the state government and through its locally created authorities. Within that system there have grown up the numerous agencies for scientific research and for technical aid on a wide range of problems which indi viduals cannot solve alone. Again, the responsibility for the care of defectives and of certain classes of dependents is assumed by the state, the agent of the citizens, in its establishment of state institutions. Likewise, the study and pro motion of public health is taken on by a branch of the state government, in recog nition of the state-wide nature of the measures required. For the construction of a system of public highways a state commission is given authority to act for the counties; and this huge project now approaches the end of its first phase, the building of the pavement slabs on the primary routes.

During the past twenty years, another function of the commonwealth has taken form. This is the task of providing several types of public recreation which it is not feasible for other agencies to provide—fishing and hunting and state parks. Two subsidiaries of the state government have been established for this purpose, the Board of Conservation and the Fish and Game Commission. The whole project of providing public recreation for ALL the people of Iowa now stands in the same class of importance as the other great state enterprises, public law and order, public education, public health, and public highways.

But the desires of the people for state-wide recreation are at present far from satisfied. From a great deal of evidence it is clear that the citizens of Iowa are clamoring for more and better recreation facilities. The available hunting and fishing falls far short of the demand. The present system of state parks fails to meet the requirements, as clearly expressed by the people, for the preservation of beautiful places, for the protection of wild life, for the enrichment of the land scape, and for active recreation such as swimming and boating, picnicking, camp ing, vacationing, etc. The Iowa Conservation Plan, then, begins as a project to map out a program for the economical and orderly satisfaction of these demands.

However, no sooner do we begin to determine the measures necessary to accomplish this objective than we find the work reaching into fields which lie out side the direct propagation of fish and game and the purchase and development of park tracts. We find that good fishing can be provided in streams and lakes only when the pollution and silting problems have been brought under control. Upland wild life, including game, must in Iowa necessarily lie mainly in the hands of the land user, the farmer, to whom sufficient inducement must be offered to justify him in maintaining suitable cover and food and protection. Waterfowl and marsh wild life can live in or migrate across Iowa only if the proper areas are set aside for them, and this involves the whole matter of surface water conserva tion. The very beautiful landscapes of this state can be restored and maintained only by a large woodland conservation program. We discover, then, that every phase of public recreation to be provided by the state, is dependent upon three major correlative factors—erosion control, the conservation of surface waters, and the conservation of forest and small cover on the land. We also discover that these three are inter-dependent. Erosion control, as dealt with in the plan, requires mainly permanent vegetation, trees, brush or grass; the balanced use of surface waters (their true conservation) requires erosion control, which in turn requires proper land cover; while woodland conservation is essential to every phase of the program.

Moreover, we find that once those fields are covered, we have covered the major types of all conservation for Iowa, in so far as they are susceptible of treat ment at the present time. And we have, not a Recreation Plan, but a Conserva- Plan, to prepare.

It seems regrettable that such conservation planning could not have been undertaken much earlier, for it could have saved huge sums of money, for example in checking unwise drainage operations; and the legal and administration diffi culties would now be far less serious than they are.

But it is still not too late. The soil and climate of Iowa work powerfully and rapidly to repair the unnecessary damage done to the state's natural resources and beauties. As Dr. Macbride has said, "Here nature asks for nothing but de fense—only for protection. In nature as in social life *great things grow.* We speak of parks and wild life and summer splendor, and Iowa responds. In this interim of our advance let us teach our people reverence for the silent power and magnificence of nature as she works incessantly for our good."

This report, then, presents the numerous elements recommended as sound and feasible for a state conservation plan, the individual items being inter-related and. in fact, almost inseparable in the Plan. For clarity of presentation it is necessary to divide this conservation plan into its main divisions, each one com plete in itself and each one at the same time properly co-ordinated with the others. The co-ordination of all the items into one closely knit plan will become evident only by careful reading of the report in full.

Nearly every section of the plan and program can be divided into two main phases, the administrative phase and the phase having to do with the acquisition

and development of sites. Hence, for the sake of brevity, the major elements are discussed below under these two headings.

EROSION CONTROL

Administrative: The whole conservation plan, including soil conservation, for its final long-term realization is dependent upon the general land and cover survey outlined in Chapter XIII. Meanwhile, the plan contemplates adminis trative action by the Board of Conservation on that type of soil erosion which the landholder cannot himself undertake, namely the gully, stream and lake bank erosion not directly affecting the crop and pasture lands. Measures to be taken comprise bank protection by various means, these measures necessarily leading back into the branching gullies. The work is to be done mainly by state technical aid to land owners, eventually through a staff of erosion control experts stationed in various districts; an expansion of the work already begun on crop-land erosion control, in collaboration with the State College.

Equally important is the fact that every other element of the conservation plan will aid erosion control. The whole water conservation program, including lake bank improvements, is aimed, among other objectives, at this basic problem. Woodland conservation, particularly reforestation, has one of its main purposes in the checking and prevention of erosion. Wherever stream improvement is undertaken for fisheries purposes, and wherever stream-bank easements are ar ranged for access to fishermen and others, erosion control is a natural part of the work. The entire state-wide game cover project will aid in checking soil wash. The land utilization plan which will derive out of the general land and cover sur vey, in co-ordination with progress in national land planning, will better determine which lands are destined logically for pasture, hay crops, and forests, and these land uses in themselves are erosion control measures.

Site Projects: The plan contemplates no land acquisition for purposes of erosion control alone. The tracts for forest preservation and for reforestation are assigned to the woodland conservation program. However, each site included in the plan, parks, preserves, sanctuaries, refuges, will naturally involve some erosion control for those areas. All told, they do not constitute a major factor in the problem of soil conservation, but as demonstrations of methods and in their local effect they are important.

Erosion control in Iowa is a long job. But there can be no question that the conservation plan must anticipate and make a start toward the day when fairly complete soil conservation is a reality for the whole area of the state.

SURFACE WATERS

While the report deals with certain ground water problems, they are rela tively less important, and there is here given a summary of only the surface water program in the recommended plan. The underlying objective is that of attaining a *balanced utilization* of the state's surface water resources. The specific uses to be considered are: public water supply, sewage dilution, fishing, waterfowl and other wild life, water power, navigation, stock watering, ice. recreation, and

value in the landscape. The effect of surface waters upon rainfall, temperature, stream flow, and ground waters are also basic considerations. The problems fall into five groups: the restoration and maintenance of water surfaces, of depth, and of water flow; the elimination or control of sewage, stock pollution, wastes, silt and algae; the provision of public access; the control and public use of water power developments; and the proper use of private and public shore lands.

The administrative measures comprise collaboration on checking sewage pollution; erosion control as discussed above and below; regulation of water powers for their best conservation values; aid to land owners on checking pollution from stock watering and barnyard wash; and the control of the use of shore and water areas, where the public interest in these great natural assets is endangered.

As site projects, the plan includes a first schedule of restorations for some twenty lakes and marshes which have been unwisely drained, the eventual con struction of perhaps thirty artificial lakes, various improvements at seventy existing lakes and marshes, with dredging as a major improvement in twenty-five state lakes, and the provision of public access at 250 points alongside streams and lakes. And this program will be extended as the work progresses.

THE WOODLANDS

Probably no other element of conservation planning is so important as "forest conservation." the conservation of Iowa's woodlands. This fact is due to the dependence of all other elements upon the restoration and preservation of trees and small growth. Erosion control, elimination of silting in the lakes and water courses, cover for wild life and game, recreation places, and the landscape—all tie back to woodland conservation. The greatest difficulties in attempting to save Iowa's wooded areas arise from two factors. First, land values are relatively so high that no public agency can now come anywhere near purchasing a large proportion of the remaining wooded areas. Hence we are driven in the main to measures for aiding the land holder to effect reasonable conservation himself. Second, insecurity of tenure renders it virtually impossible for the owner of today to take a long-term conservation point of view. The measures set up in the plan are aimed to do all that is feasible in the present situation toward obviating this latter difficulty, in anticipation of changes in the system which will make land tenure more secure either in private or in public hands.

Administrative: The recommended general land and cover survey will greatly clarify the whole problem in determining the status of woodlands, in formulating a land utilization plan, and in discovering areas destined for re forestation. Meanwhile, the most valuable administrative measure is that which will furnish to the landholder technical assistance on planting cut-over lands and on saving the remaining wooded areas, at small cost, and probably at a greater profit to himself. The first detailed woodland surveys, carried out to assist in establishing such methods, show that for one important area a simple change in the tie-cutting specification would save an essential remnant of the trees and at the same time make possible a partial cutting every twelve or fifteen years instead of every forty years, yielding a greater average annual revenue to the owner.

Here lies the greatest opportunity for preserving hundreds of thousands of acres of woods otherwise in constant danger of destruction. For this purpose, adminis trative co-operation between the State Forester, the State College, and the Board of Conservation is in process of development. The Plan includes forty-five existing wooded or deforested areas most urgently requiring treatment of this character.

Reforestation is still only in its beginnings, but with intensified competition among farm lands everywhere evident, it is dear that large areas will be available for this use, either upon reversion to the state or through private action. This trend will not go nearly as far as it has begun to in other states, but it is bound to be important in the Iowa situation, in view of Iowa' s comparatively small pro portion of original and remaining woodland areas.

Several legislative measures are suggested in order to make woodland con servation more secure and to aid the landholder.

Sites: Every state park, every state preserve, every game refuge, every sanctuary, every lake shore property, every stream easement, every water power development, every roadside park, and every county or city park or forest is to a greater or lesser degree a woodland conservation item, even though it is not specifically so designated. Among the state preserves, the recommended plan in cludes seven sites, totalling about 4,400 acres, which are classed as Forest Pre serves, the primary purpose in these instances being to save in state ownership at least a portion of these seven most outstanding forest tracts.

With all of the site projects planned for accomplishment, the major problem is still that of aiding the owners of the two million acres of private woods and of the two million acres of deforested land which the state cannot now purchase, to restore and preserve natural forest growth.

WILD LIFE

Under suitable circumstances, an almost infinite variety of wild life forms can live in Iowa, to add interest and delight to human living. Such suitable cir cumstances exist generally in places not used for the "practical" activities of men. that is in woods, low growth, marshes, lakes, river margins, unbroken prairie, wild breaks and gullies. Wherever these types of environment are available wild things will find refuge. Hence, virtually every other element of the conservation plan has a direct bearing upon the restoration and preservation of wild life: parks, preserves, game refuges, lake restorations, marsh projects, artificial lakes, wood land conservation and soil conservation measures, the roadside improvement pro gram, and the whole upland game schedule for re-establishing cover and feeding grounds. This is in itself a great wild life program.

But it is not enough. We must know more than we now do about the specific environment required by the scores of more desirable kinds of birds and animals which Iowans want to see and hear and study. The main administrative problem is that of extending the wild life research project to include these non-game types. With the knowledge so derived, it will be possible to adjust the vegetation, etc., at points suitable, in such a way as to fairly well insure the self-maintenance of the wild species. Here, simply enough, is the whole secret of bringing back and

keeping a rich supply of the most beautiful, interesting and beneficial wild creatures native to this state.

Meanwhile, for certain outstanding species or groups, definite site projects are included in this plan. Only non-game types are discussed here. Five "sanc tuaries" are planned for general upland types; and one major marshland sanctuary (distinct from the "refuge" for game purposes) is scheduled for the observation and study of marsh forms of wild life. Two other areas are assigned specifically to sharptail grouse; two to wild turkey; three to prairie chicken; two to deer; several to ruffed grouse; and one to beaver. It may not be impossible to also put a few buffalo on a state prairie preserve. Here is provision for these most spec tacular forms which it is still possible to save or restore.

The fulfillment of this large program would assure song birds and small animals in enormous variety along every roadside and near every farmstead, as well as in every state-owned park, preserve and refuge.

THE CONSERVATION OF GAME

The prospective situation for shootable game in Iowa reduces itself to this: for quail, the game management measures set up by the plan and now in process *may* produce a sufficient abundance of native bob-white to again justify restricted and controlled shooting, mainly in southern Iowa. The ring-neck pheasant can in all probability, through the program, now under way, be made to supply greatly increased hunting over the northern half of the state; and the scientific study and experimentation undertaken in the southern section may eventually result in a good pheasant crop for that area also. The hungarian partridge, by management and extension of the range, is pretty well assured of later classification as shootable game in the northwestern counties. Waterfowl shooting is certain to be improved by the projects now planned, and by the later projects as yet undetermined. Squirrels will apparently remain abundant wherever woodlands are saved. The cottontail rabbit is threatened only by disease, which is a problem for study by the wild life research staff at the State College. The status of the red fox requires further study, but meanwhile it is an item of sport in southern Iowa and the pelt has some economic value.

Recommendations are made for increasing and conserving the important commercial fur-bearing mammals. The game survey has determined that the fol lowing native wild animals and birds will not again be sufficiently abundant to permit hunting them: deer, wild turkey, sharptail grouse, ruffed grouse, and prairie chicken. Hence, sanctuaries to preserve them in at least a few places are to be provided under the plan as outlined above in the section on Wild Life.

UPLAND GAME: For the upland game species, quail, pheasants, and Hungarian partridge, the program involves primarily the restoration of suitable cover and nesting grounds, not on a few concentrated areas under state ownership, but on literally thousands of farms over a great part of that section of the state where each of the species is to be produced. Consequently, the basic objective is to induce the farmer to cooperate in creating a suitable environment. Technical aid to the landholder by the game authorities of the state, adquate protection to the farmer

against trespass by control of the number of hunters on any one farm, and. if it proves successful, monetary compensation to the farmer for his effort in cooperation through a system of paid shooting permits— these are the measures on which the program is based. In addition, the plan includes a system of refuges for uplahd game. All told, over a hundred such sites are designated, including sections of waterfowl projects, state parks and preserves, a number of special upland game refuges and a number of miscellaneous areas, such as drained lake beds.

WATERFOWL. The migratory waterfowl program comprises, first of all. the classification of all state-owned lake and marsh areas to distinguish and set aside the sections most valuable as refuges on one hand as public shooting grounds on the other. Sixty-two natural state lakes are to be handled in this way.

Second, some thirty state-owned marsh areas are scheduled for improvement for waterfowl purposes by damming, planting, etc., and in nearly every case by the acquisition of additional land or marsh area.

Third, thirteen drained or partially drained marshes are planned for ac quisition and restoration, and seventeen existing marshes are scheduled for pur chase. This is the first section of the program only, and it may be extended with the determination of new areas and the expansion of the program. The water - fowl refuges and shooting grounds are scattered widely over the state with the preponderance of them in the northern lake district and along the Missouri and Mississippi Rivers, where the natural features are most abundant. *

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THE CONSERVATION OF FISH

I For the improvement of game fishing in Iowa the state divides itself naturally into four fairly district areas, although there is some overlapping between them. First, the southern area, that district lying south of a line roughly described as extending from Sioux City to Des Moines and thence to Dubuque, is now largely dependent upon muddy polluted streams and a few privately owned or locally owned lakes. With the control of erosion and pollution, the fishing in the rivers can eventually be improved, but it will probably never be very good. Hence, the fisheries program for this entire southern part of the state involves the construc tion of artificial lakes, and the plan provides for an ultimate total of some thirty such lakes ranging from fifteen to three hundred and fifty acres in area. These are to be distributed across the entire territory so that good bass, sun-fish and perch fishing will be available within an easy hour' s drive from any home. These arti ficial lake projects tie up closely with other elements of the plan, such as reforest ation, erosion control, parks and preserves, water conservation, and general recre ation.

Second, all that territory lying north of the southern area, but excluding the district of the natural lakes and the district of the trout streams, has been desig nated as the small-mouth bass area. Here, the river fishing facilities may be gradually increased by stream improvement and stocking, as well the as by check ing of silting and pollution.

Third, in the district of the natural lakes the major item of fisheries development lies in the program to improve the lakes themselves and to manage them under skilled technical direction. Dredging is scheduled in twenty-five state lakes; the algae nuisance involves technical scientific study and management for its correction; and other improvements include level control, bank protection, control of silting, control of aquatic vegetation, elimination of sewage pollution, and control of pollution by stock and barnyard wash.

Fourth, in the extreme northeastern comer of Iowa there are a number of first-class trout streams. These are in process of improvement by the provision of shade along the banks and of better spawning grounds and sheltered places in the streams themselves.

For the artificial production of fish four major projects are planned, two bass rearing ponds in northeastern Iowa, one bass-rearing pond in northwestern Iowa, and one trout-rearing pond in the northeastern section. Eventually, a fish rescue station may be established on the Missouri River J

This is a meager outline of the extremely intricate procedure by which it is expected to make fishing in Iowa better than it has ever been, possibly better than it was before the occupation of the state by white men.

STATE PRESERVES AND STATE PARKS

The primary function of the commonwealth in this field is that of *preserving* sites of outstanding interest *which local agencies cannot be expected to handle.* Hence, the plan undertakes to establish first of all a system of Preserves, about seventy-five all told, their main purpose being literally to save these most important features throughout the state for the use of the large number of people deeply interested in their unique character. To provide for the more intensive and larger scale outdoor recreation demanded, there are designated, in addition to the preserves, some seventeen State Parks, where the natural beauties may be preserved and where *also* there may be offered facilities for such recreation as swimming, boating, camping, vacationing, riding, and organized winter sports. For several reasons, both of economy and of practical use, the distinction between the state park and the state preserve is considered essential in the plan. The preserve is not a lower classification but rather a *more special one,* aimed to accomplish the purposes inherent in saving for public use those areas not needed for crowded recreation and which would be injured by crowds. The state park, then, in addition to serving as a preserve, is intended to fill the demand in all parts of the state for recreation facilities, to be used by hundreds or thousands of people at one time.

The preserves include historic points, sites of most unusual scientific interest (geological phenomena, Indian mounds, and rare types of plants), parts of seven outstanding forest tracts, twenty-one sites for access to state lakes, three water power pond preserves, and sixteen other sites of unusual scenic beauty. These seventy preserves overlap in their classification, most of them serving to preserve

more than one kind of feature. Included are twenty-one of the existing "state park" areas, those eligible for continued state ownership and management which will be most useful classified as *preserves* and maintained as such. Most of the preserves will make provision for picnicking, many for hiking on trails, several for boating and bathing, and so on, but in none should the primary purpose be exposed to the certain damage of large crowds on small areas. The preserves are dis tributed widely over the whole state and comprise those areas found to qualify for state action out of the several hundred sites which were suggested from various sources and which were examined in the conservation survey.

The basis of the state park plan, as distinct from the plan for preserves, lies in three major considerations. First it is planned to provide within a two-hour drive from any home in the state, accessible by good roads, facilities for certain types of large scale outdoor recreation, *in addition to the preservation of natural beauty.* This is the factor determining the geographic distribution of the state parks. Second, most of the park sites are to be *big enough* to accommo date intensive recreation by large crowds in a setting of relatively unspoiled natural landscape. Third, each is planned to make available to the people that most un usual and beautiful site in the section of the state to be served. On this basis, ten of the existing state parks are classified among the state parks in the recommended conservation program. To these ten the plan adds seven new state parks, in order to give recognition to those territories not adequately served at the present time, and selected so that each one is qualified as a state park project. The preserves will frequently have recreation facilities, but the parks may have more of them and on a somewhat larger scale: picnic and camping grounds: hiking trails, nature trails and perhaps riding trails; swimming and boating: zoos or museums; inns and cabins; fishing; play fields (not "playgrounds"); tobogganing, coasting, skiing; and sometimes golf. Every park will not have all of these items in its development, but each will have some of them. Scenically. no two of the sites are alike, but every one is situated at a point of remarkable interest and natural beauty.

Here is a program which will give Iowa a really magnificent system of state parks and preserves, carefully co-ordinated with the other elements of the con servation plan, and at an insignificant cost per family per year over the next fifteen to twenty-five years. The prospective National Monument in north eastern Iowa is an important element in the plan.

THE HIGHWAYS

It is considered that the function of the conservation plan with reference to highways is only to aid the Highway Commission in its work. The ultimate high way program, however, has a definite bearing on several phases of the conservation plan. A system of scenic highways is a most important part of the whole recrea tion program. Supplementing the other state properties it is anticipated that some hundreds of roadside parks may eventually be developed. The roadsides themselves in their influence upon the landscape and upon the pleasure of driving, in their relation to soil erosion and in their relation to all forms of wild life, neces-

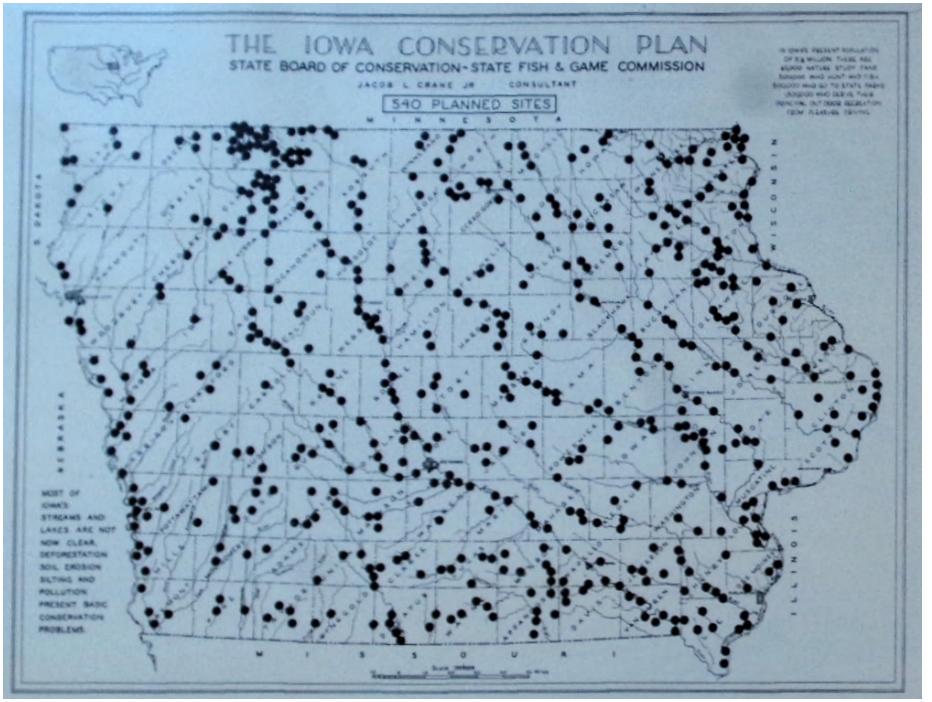


PLATE I — A TOTAL OF 540 SITES RECOMMENDED FOR THE TWENTY-FIVE YEAR CONSERVATION PLAN

sarily integrate closely with the other features of the plan. Hence, the report outlines a scenic highway and a roadside park system, and it makes suggestions with reference to roadside development.

COST

Estimated at present prices, the cost for land and improvements over a long period of years will run to a total of between two and three dollars per person, or between nine and twelve dollars per family. About half of this total capital cost is assigned to fish and game conservation projects, to be financed entirely out of hunting and fishing license fees. The other half, largely for state parks and preserves, amounting to about five dollars per family, if spread over a development period of fifteen years, will cost less than fifty cents per family per year for the capital investment—land and improvements.

The administration of the game and wild life divisions of the program are, like their site and improvement items, proposed to be carried by the license fees. Administration of the general conservation and park program, will be partly self-supporting through concessions and special service fees. The part not supported

in those ways, can best be taken care of by a source of regular income, such as a share of the gasoline or automobile taxes, the cigarette tax, or a tiny mill tax.

While this year it is painful to discuss costs, the program is one that will be very easy for Iowa to carry.

EUROPE AND IOWA

Nearly every family in Iowa comes from European racial stock, the great preponderance from the Northern European races- German. Bohemian. English. Irish, Scandinavian. There is good reason to believe that the development of Iowa will follow, in a shorter period, much the same sequence of conservation as that found in these European countries. Iowa's lands have now been put into use. The steps still to be taken all tend towards a more "finished" countryside. Erosion control will bring wooded instead of scarred gullies. The fields and fence rows will be more regular and neater, with more hedges and trees. Farmsteads will be re built and re-planted and will become more and more a picturesque part of the landscape. Woodlands and reforested lands will be found in huge tracts under public as well as under private management. The streams and lakes will be used in a rational, balanced way, and their banks will not be wild, but under control by planting, revetment, etc., and by their use for public recreation. All of this merely marks the transition from a pioneer to a civilised state of affairs. And there is no essential conflict between the desires of the conservationists (or of any civilized citizen) and the "finishing" process which Iowa is now starting. There will be an advance to conditions which reconcile the economic with the recreational uses of the land. This will result naturally from the circumstances of life, aided and guided in a multitude of ways by the Conservation Plan.

IOWA'S PROSPECTS

Iowa has a fine opportunity to provide an orderly, beautiful country land scape, rich in wild life and in recreation values. Its two greatest assets are the soil-climate combination on one hand, which produces rich varied growth quickly, and, on the other hand, the high level of common interest among the people, which leads easily to the expression and realization of the public will, as in this matter of conservation. The greatest danger to conservation in Iowa is the insecurity of tenure on the part of the landholder. Not until land can be held securely by a private owner or tenant, or, on the other hand, by public agencies, not until such a situation exists, can conservation, in some of its most important phases, succeed consistently.

No plan for the future can fail to recognize the trend toward a greater pro portion of leisure time, both for city and for country people. We are so in the habit of thinking of leisure as only a small part of our time that it is not easy to grasp the vast importance of the prospect that shortly we may have more than half our waking hours free to do with as we please. How shall we use three holidays each week, and four unoccupied hours each working day? Obviously the answer will vary with the temperament of the individual, but in any case, the use of

recreation facilities will be enormously intensified. Faced with this probability, the Conservation Plan for Iowa again takes on recreation as perhaps its most important phase, and the plan here set forth is indeed meager when viewed in this light. It must be called a first statement only, to be followed by considerable modification and particularly by enlargement in its scope.

Economic security in Iowa is essential to good living in all of its aspects, and it is essential to the execution of the Conservation Plan. With that achieved, the people of Iowa, living without congestion on this rich and beautiful countryside, can easily create for themselves as fine and, in most ways, as satisfying an environ ment as can be found anywhere in the world.

An Example of European Erosion Control

CHAPTER I

THE GENESIS OF THE CONSERVATION PLAN

ORIGIN—RANGE LIMITATIONS

The idea of conservation has been generating in Iowa for decades. Forty years ago Dr. Thomas H. Macbride, afterward president of the University of Iowa, in a series of imaginative lectures set forth the great purposes of conserva tion. The standard was taken up by those few who were able to catch the vision and its possibilities, and then by groups and organizations in constantly in creasing numbers. As it stands now, there can be few people in the state who haven' t a definite interest in one or more phases of the conservation movement. The landholder and the farmer, judging from recorded data and from personal contacts, is aroused to the need for conservation of the soil and the woodlands. Further, he wants the fine landscape of Iowa protected, he wants reasonably good fishing and hunting, he wants native wild life to have its fair chance, and he de mands and uses the kind of outdoor recreation which only the state can provide at State Preserves, State Parks, and State Lakes. First for the improvement of his economic situation, and thereafter for the enrichment of his life and his family's during their leisure time, the country citizen calls on the State to undertake a very wide field of conservation. The townsman in Iowa is peculiarly responsive to the farmer' s requirements, and he recognizes the fundamental necessity of meeting those requirements. He also expresses for himself much the same eco nomic and recreational demands. By these demands, a broad field is set for the conservation plan to cover.

About three years ago the pressure for *wider active conservation measures* came to a focus with the realization that up to that time the conservation move ment had remained diffuse and somewhat inefficient. Opinions varied widely on the feasibility of certain projects and on methods of carrying them out. Few indi viduals or agencies had a broad grasp of all the inter-related factors or of the practical realities in the whole situation. Some of the available funds were plainly not used to the best effect. Many urgent problems remained untouched for lack of a definite knowledge of how to attack them. Out of this confusion sprang the idea of preparing one comprehensive conservation plan in which each element could take its proper place, coordinated with the others, and in which the effort and moneys expended could be directed most effectively and economically.

In March 1931 the General Assembly adopted a joint resolution, which was approved by the Governor, instructing the State Board of Conservation and the State Fish and Game Commission to collaborate on the preparation of a long-term Conservation Plan and Program. While every branch of the state government is obviously concerned, particularly such departments as those of agriculture, for estry, and public health, nevertheless, the two agencies named in the legislative resolution were deemed best to cover the fields not otherwise well covered, and to

coordinate all the projects into one plan which they and other agencies, both public and private, could use as a guide.

The resolution reads, "such plan..... when completed and approved by the state board of conservation and the fish and game department, subject to the approval of the executive council, shall constitute a definite and well-ordered twenty-five year budgeted program..... toward which the various funds available for conservation in Iowa..... may be concentrated and spent in an orderly and scientific development of the natural resources, recreational areas and park systems of the whole state..... "

The terms of the resolution, then, like the demands of the people, open the way to a study of all phases of conservation and development. Correspondingly, the conservation plan survey has reviewed the entire field and reduced it to those elements which have the most vital and most direct bearing upon human living in Iowa. The plans now recommended include many matters not previously touched upon by any state authority, but they do not intend to encroach upon the field of any existing agency. The Plan correlates and makes specific and concrete the otherwise scattered vague requirements and proposals in fields rang ing all the way from certain aspects of soil erosion control to song-bird sanctuaries. It recognizes three divisions, or points of attack, the economic, the scientific, and the recreational.*

So there is no limit to the range of the Conservation Plan except that of usefulness and practicability, (which of course eliminates many intangible pro posals). But in the whole plan there is definite recognition of the critical limita tion of finance. It has been assumed, in fact, that no money would be available to use under the guidance of the Plan that would not be available without any plan. Thus, the direct purpose of the Plan is to make those funds go much farther than would be possible without an orderly program.

Viewed in another way. however, the moneys available for conservation, measured as above indicated, are ludicrously small.

All told, conservation and conservation development in Iowa have been using each year:

Board of Conservation.....	$150,000**
Fish 8s Game Commission (licenses).....	250,000**
Other Miscellaneous, perhaps.	..100,000**
Total.....	$500,000**

This total runs only twenty cents per capita per year for all phases of con servation work. Certainly, conservation in Iowa, with its enormous economic and humanitarian values, has been greatly under financed in proportion to other lines of activity. And it is dear that the pressure of demand upon the Board and the Commission will bring forth larger funds, whether or not a plan is used for guidance and economy.

*A classification suggested by Dr. Bohumd Shimelc.
**Ben leas than these figures in 1932.

CHAPTER II

THE CONSERVATION PLAN SURVEY

ORGANIZATION

The Iowa State Board of Conservation —

Mrs. Henry Frankel, Des Moines, Chairman
Mrs. Grace Gilbert King, West Union
Mrs. C. C. Laffer, Sigourney
T. D. Long, Man son, from Jan. 1, 1933
Wm. P. Woodcock, Spencer
J. G. Wyth, Cedar Falls, to Jan. 1, 1933
W. E. G. Saunders, member and chairman until Jan. 1, 1932
Mrs. R. H. Volland*. Iowa City, member until Jan. 1, 1932

The Iowa State Fish and Game Commission —

Dr. W. C. Boone, Ottumwa, Chairman
J. N. Darling, Des Moines
Dennis H. Goeders, Algona
Arthur E. Rapp, Council Bluffs
Dr. J. F. Walter, McGregor

[1]Deceased; a great loss to conservation in Iowa.

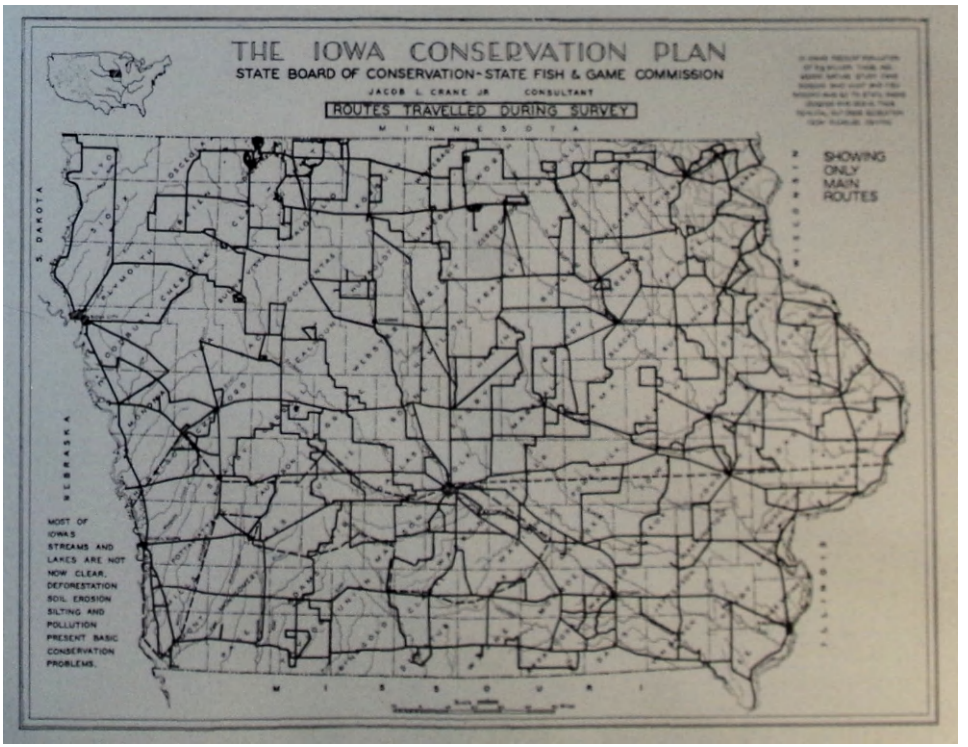


PLATE II THE SURVEY INVOLVED 40.000 MILES OF MAIN ROUTE DRIV1NO AND FLYINO

Consultant and Director Jacob L. Crane. Jr.. Chicago
Associate — George Wheeler Olcott
Secretary — Ralph E. Kittinger, to Jan. 1, 1933
Secretary — Ross Ewing, from Jan. 1, 1933
Clerk - Claire Freiberg
Superintendent, Board of Conservation M. L. Hutton
Landscape Architect, Board of Conservation — John R. Fitzsimmons
State Game Warden to July 1932 — W. E. Albert*
State Game Warden from July 1932 I. T. Bode
Secretary, Fish and Game Department Mrs. I. G. Rhoads
Consultant on Hydrology Professor Floyd A. Nagler
Consultant on State Parks — S. Herbert Hare, Landscape Architect
Adviser on State Parks Herbert Evison, Secretary, National Conference on State Parks
Adviser on Landscape and Planning Professor Phillip H. El wood
Advisers on Geology - Dr. G. F. Kay, Dr. J. H. Lees
Advisers on History Edgar R. Harlan, Professor Benjamin F. Shambaugh
Adviser on Indian Archeology Dr. C. R. Keyes
Health Department - Dr. D. C. Steelsmith, A. H. Wieters, Wm. Mark
Biology of the Lakes — Dr. G. W. Martin, Dr. W. W. Prescott
Advisers on Forestry Professor G. B. MacDonald, Professor W. H. Homing
Advisers on Forestry — U. S. Forest Service

*Deceased: **for many years a leader in Fish and Game work.**

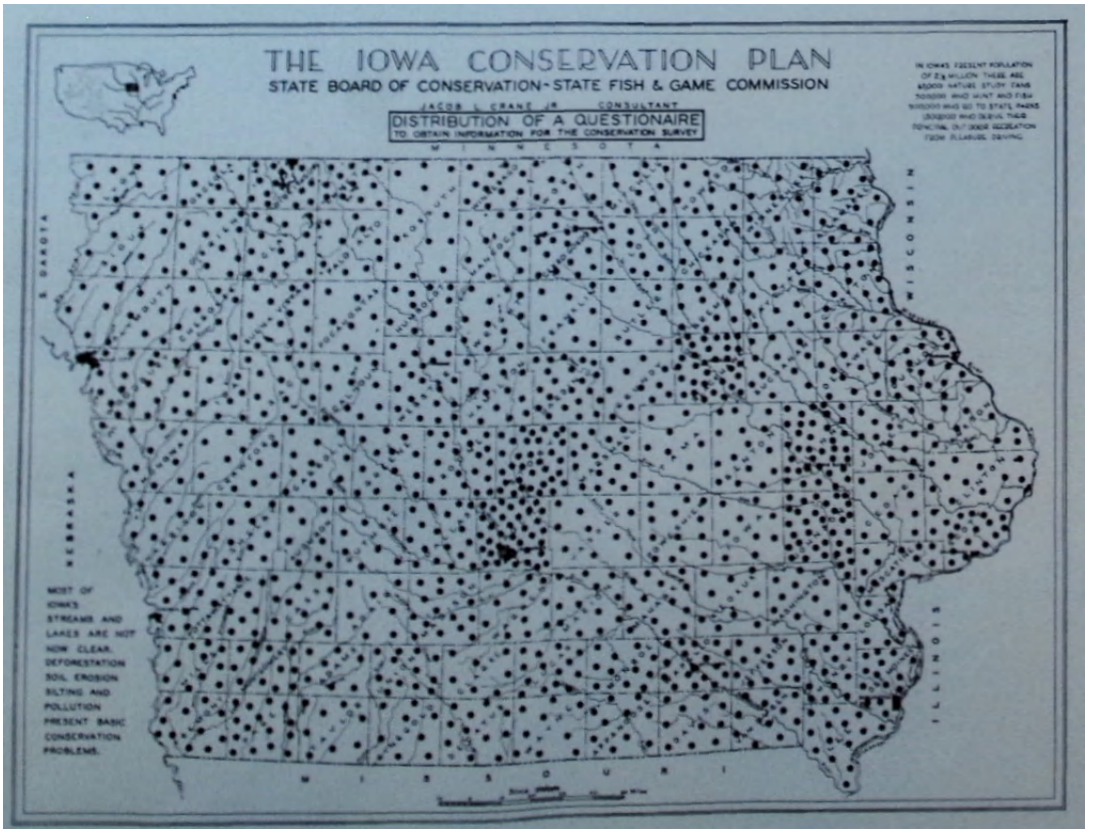


PLATE 111 THE SURVEY INCLUDED DISTRIBUTION OF 1.200 QUESTIONNAIRES

Director of Game Survey — Aldo Leopold
Assistants on Game Survey — Wallace Grange, John Ball, Dr. W. F. Kubichek, T. K. Johnston
Consultant on Wild Life — Professor H. M. Wight, School of Forestry and Conservation, University of Michigan
Advisers on Wild Life — U. S. Biological Survey
Director Fisheries Survey - Dr. Carl Hubbs, Institute for Fisheries Research, University of Michigan
Assistants on Fisheries Survey - J. C. Salyer, Ves Baur. Dr. A. H. Wiebe, Dr. M M. Ellis
Advisers on Fisheries Survey U. S. Bureau of Fisheries
Land Utilization — U. S. Bureau of Agricultural Economics

Approximately a thousand others contributed assistance, including County Farm Agents, County Engineers, the State Highway Engineer, Game Wardens, Sportsmen, Garden Clubs. Commercial and Civic Organizations, Ornithologists, Women's Clubs. Scientists, Engineers, the American Legion, the Farmer's Union, the Iowa Academy of Science, and faculty members at the State College and the University.

In building up the organization for the survey, the personnel material of the country was canvassed to draw into this work the most valuable men available at the time, within the limitations of the funds to be used. Probably never before in America has so varied and so skilled an assembly of talent been set to work on a co-ordinated conservation planning project. The task of conducting the survey

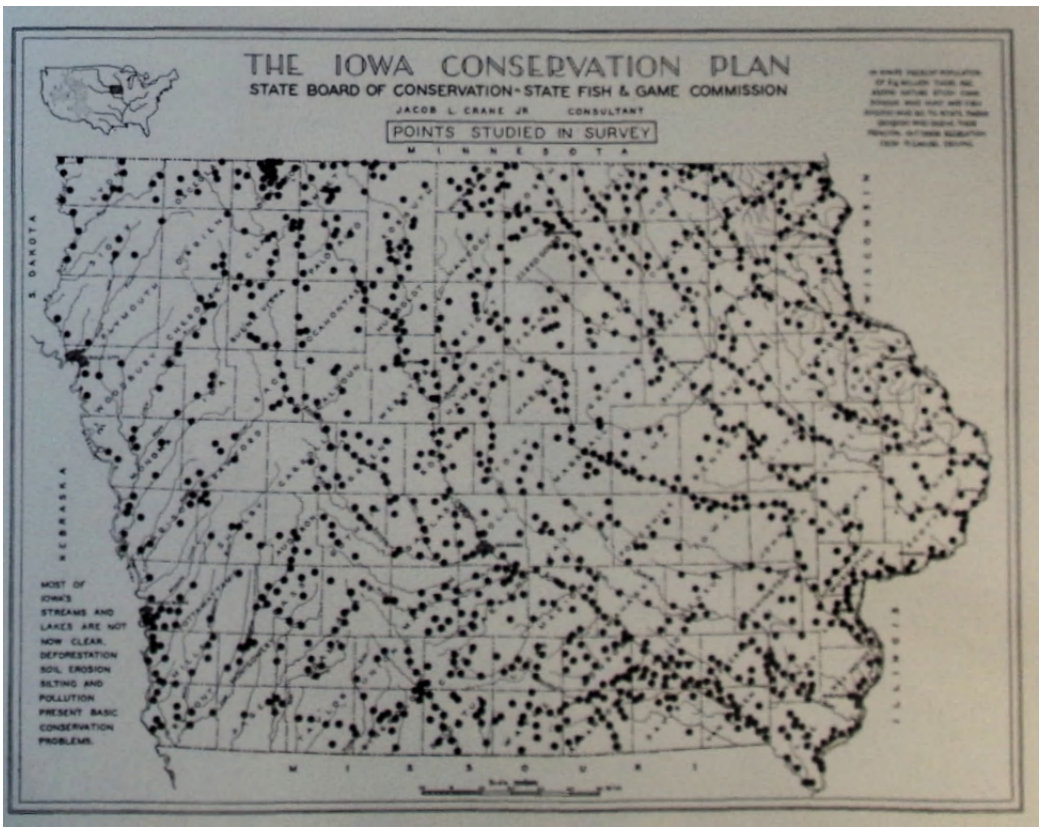


PLATE IV THE SURVEY EXAMINED 2.000 POINTS FOR VARIOUS PURPOSES

and preparing the report has been one of "re-integration engineering." It has been necessary to draw together in one comprehensive planning operation experts from many fields which have become highly specialized — biologists, geologists, biochemists, foresters, agronomists, landscape architects, game experts, fisheries experts, hydrologists, historians, archeologists, sanitarians, economists, and several varieties of engineers. Over all, there has been available the extremely con scientious. sensible, careful control of the commission and board members, to whom the consultant at this point wishes to make most grateful acknowledgment.

The survey covered an immense range of investigation, as will be seen from the report, although a great deal of the collected material is not shown in this printed volume. However, because of the limited fund available, it was impossible to study all the items exhaustively. The recommendations here made are believed to be sound and secure, but further investigation will be needed to carry out the many branches of conservation and development through later years. The most important item for continued investigational work is comprised in the general land and cover survey recommended and briefly described in Chapter XIII. In addition, a number of other researches and studies are suggested.

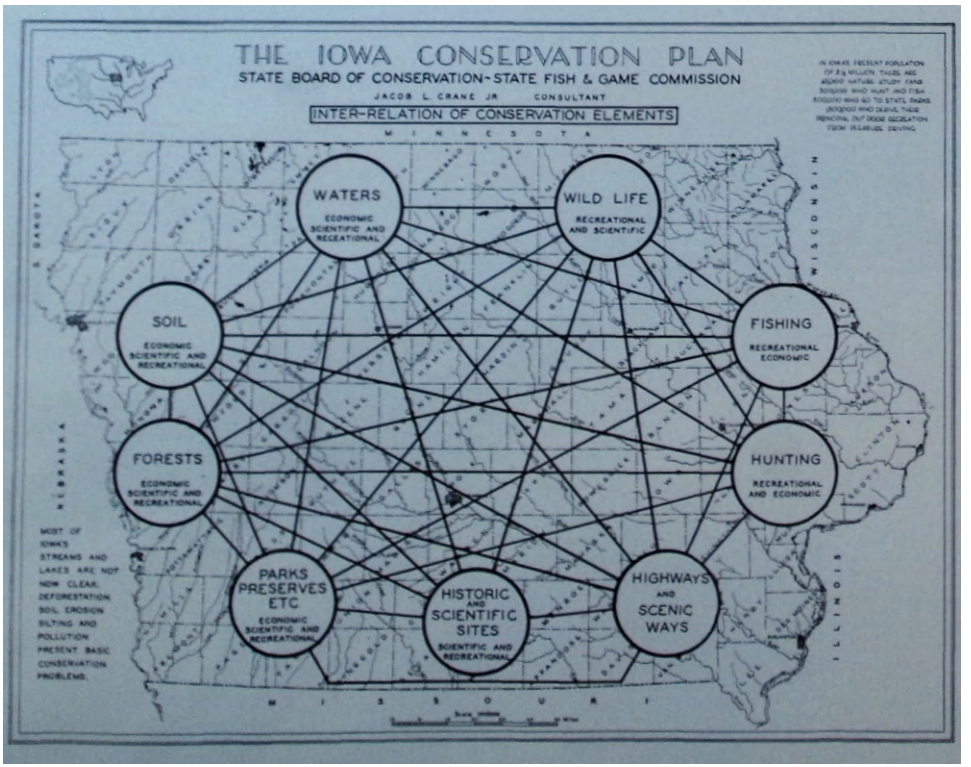


PLATE V — A1-1- ELEMENTS OF THE CONSERVATION PLAN ARE INTER RELATED

The conservation survey on which this report is based included a great deal of held work. Several hundred individuals took part in the held studies. Ques tionnaires were sent out to 1.200 persons who were deemed qualified to make suggestions and look at sites in the various divisions of conservation, and this involved huge totals of driving and walking over all parts of the state. The cen tral staff itself covered 40,000 miles of driving, which does not include the side trips nor the retracing of lines of travel. Through the courtesy of the Des Moines Register-Tribune air service, and by commercial hying, about a thousand miles of air travel made it possible to look over ground otherwise difficult to reach within the time available.

Not less than *2,000* different points were studied during the survey in con nection with one or more phases of the conservation plan.

Altogether, the survey, which extended over a period of a year and a half, made it possible for the boards and the staff to become well-informed about the general situation and about specific problems and possibilities, and it placed them in a position to sensibly balance one proposal against another in selecting the site or the conservation measure best adapted to the purposes in mind. Every recom mendation has passed through the sieve of examination, cross-examination and re-checking. It is believed that at no *point in the plan and program* are better sites or better methods now within reach than those recommended.

CHAPTER III

THE HISTORICAL BACKGROUND

An understanding of certain phases of Iowa' s history is essential to the whole concept of conservation. A great mass of historical material was studied through, and from it the following very brief resumes have been drawn up.

A —IN GEOLOGIC TIME

Only two hundred and sixty years ago Iowa was first seen by white men. The changes which have taken place in the face of the land during that period concern us most in conservation planning. But the situation which we inherited, and which we modified so greatly by our human activities, has been in process of formation for perhaps 500 million years. Throughout that unimaginable period

*From notes supplied by Dr. J. H. Lees, Assistant State Geologist.

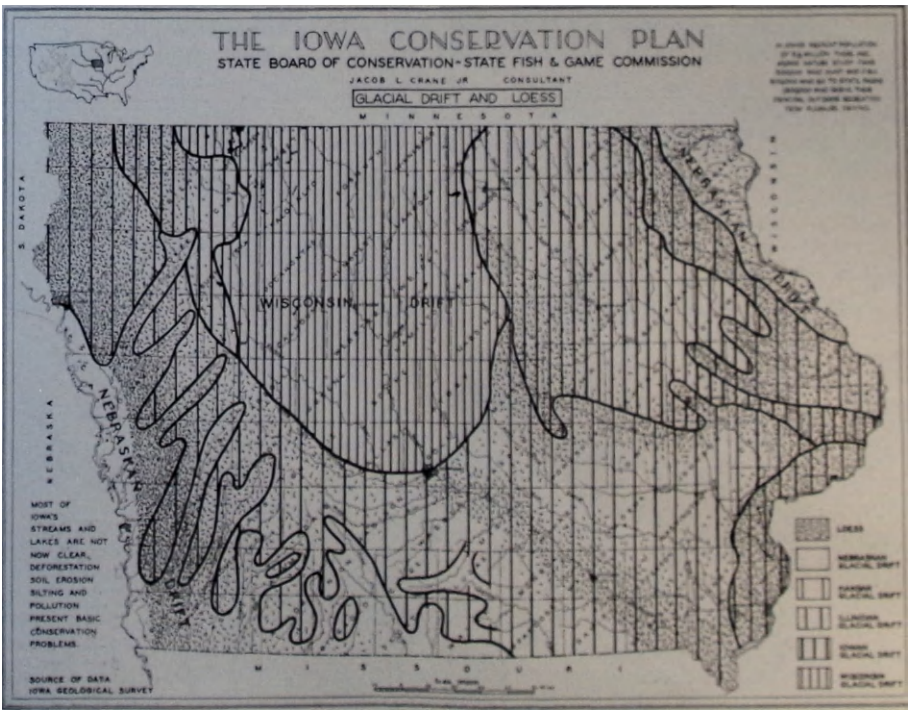


PLATE VI EARLIEST DRIFT AREAS ARE ROUGHEST: NEBRASKAN
LATEST DRIFT AREA IS MOST LEVEL; WISCONSIN

of time six major forces worked on the geological structure and on the modelling of the surface of this state. First, the solidifying of the earth's crust created the underlying granite rock in a season of apocalyptic turmoil. Second, the surface thus formed was several times inundated by the ocean, which very slowly deposited those successive layers of sedimentary rock now constituting the limestone, slate, sandstone, and quartzite beds. Remnants of beautiful semi-circular coral reefs are still found in Iowa, high and dry, built up long ago in the sea water, just as such reefs are constantly in process of formation today throughout the southern seas. It is the sedimentary strata which carry the limestone, the sandstone, the quartzite, the gypsum, the coal, and the deep-well waters upon which so much of our economic life is dependent. Further it is these strata which outcrop in fantastic and lovely rock walls along so many of the rivers.

Third, during a period of many thousands of years, tremendous mountains of ice, the glaciers, pushed down from the north in five great invasions, on the one hand levelling off the surface and gouging out basins and, on the other hand, when they were melted by the return of a warmer climate, depositing their burden of worn rocks, sand, gravel and clay. This glacial "drift" although hundreds of feet deep in some places, is a comparatively thin layer on top of the sedimentary strata beneath it; and in it the shallow ground waters, which seep down through the soil, flow slowly to the valleys or lie impounded in pockets. And in the deeper

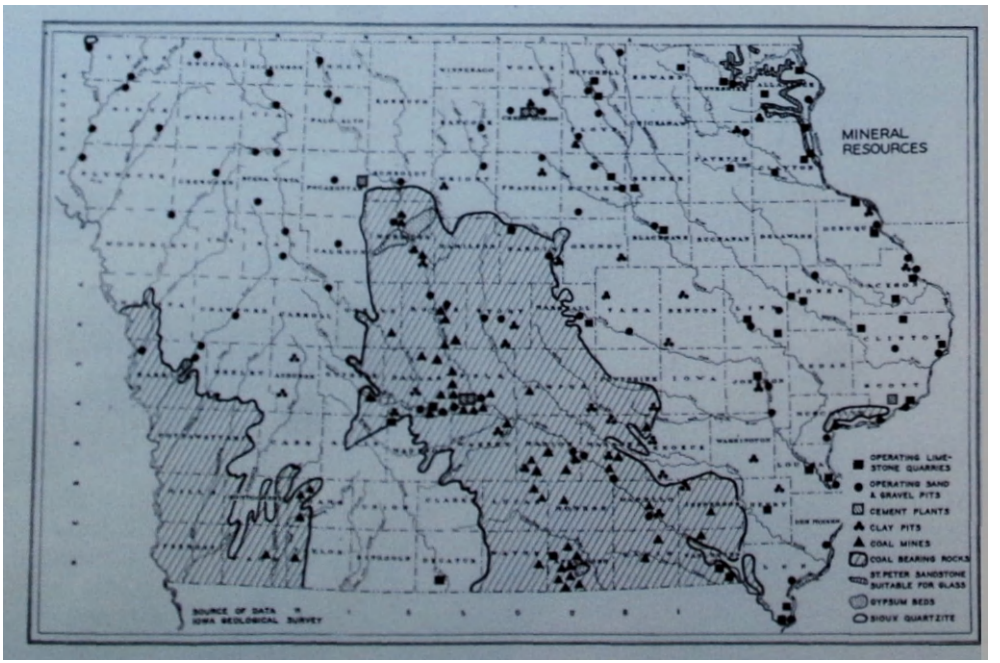


PLATE VII — LARGE COAL RESERVES - ONE OP THE LAROBST GYPSUM DEPOSITS IN THE UNITED STATES

surface basins of the drift the ground water emerges as lakes. This is the origin of all the northern lakes.

Fourth, the westerly winds of the great plains carried, and placed over a large part of Iowa in a layer of loess, the fine clay particles which form the wild bluffs along the Missouri and the top ground for all but the north central third of the state's area. In places this wind-blown loess deposit is three hundred feet thick. Over the Wisconsin drift area, there is very little loess deposit.

Fifth, the rains falling upon the land, century after century, gathered in rivulets, collected in streams, and. as it flowed southward wore away the surface little by little, but irresistably, until the great valleys of the Mississippi and the Missouri and the little dales and gullies until it had caused virtually all of the modelling of the ground which we now see. This has been a long and ceaseless process of erosion, down through the loess, through the sand and gravel drift, and deep into the sedimentary rock. Thus the form of Iowa's land is largely a record of erosion, from the "young" flat basins of the north to the older abrupt, rock-faced gorges of the lower rivers.

Meanwhile, a sixth process has been going on. with interruptions, for hundreds of years. The frost cracked up the stones, as did also the roots of plants, and the first soil was formed, sufficient to support vegetation, which in turn by its own formation of plant mould enriched and added to the soil. A long succession of vegetative forms battled it out over the prairies and along the streams, until supremacy rested upon the prairie flora and on the bottomland timber as we found them. Likewise, the native forms of animal life struggled, one species with another, adapting and readapting themselves to the changing environment, many disappearing until finally those that survived were found here in a situation of comparative stability, which was again upset when we so suddenly changed the picture by cutting and plowing and living here.

Thus, in briefest summary, the story of the manner in which the state of Iowa got its surface characteristics before we began the project of subjecting the land to human uses, wisely and unwisely.

B —NOTES ON INDIAN LIFE

Of the eighty-five groups or stocks of Indians which existed in the United States, two lived in Iowa, the Algonkian and the Siouan. The Algonkian tribes, namely the Muscouten and the Peoria, inhabited chiefly the eastern and central sections of the state. They lived in villages and camps the remnants of which are now found hidden in the forests along streams. The Siouan tribes Ioway. Omaha, and Manden, were the people of the great open prairies.

The favorite location for an Algonkian village or camp site was on the second terrace of a river valley, or. less commonly, on the broad summit of the hills over looking a river. On the Little Sioux between Cherokee and Linn Grove are to be found the largest number of known village locations. Circular depressions still exist at two of these sites to indicate where earth lodges stood. In the north-

*From material supplied by Dr. C. R. Keyes.

eastern section of the state the caves and over-hanging rock walls of the river gorges were extensively used as shelters.

Near some village sites, pits have been found which are considered to have been used for storage of food supplies. Along the rivers shell-heaps constitute a record of the importance of mussels as a food. Not the least interesting items are the work-shop sites, where the stone implements of the Indians were fashioned. Finally, there remain a good many cemeteries and a number of important groups of burial mounds.

Originally thousands of these mounds existed on the hill tops along the main rivers in every part of the state except the southwestern. The majority of the mounds are round. The "effigy mounds/' in the shape of birds and animals, and the linear mounds, (both among the very finest on this continent) have been found only on the high bluffs of the Mississippi River.

As is well known, the Indians secured their food by hunting and fishing, sup plemented by growing maize and gathering wild fruits. Except under the direc tion of white men the Indians probably could not survive in the clean-farmed Iowa of today. One Indian "reservation," near Tama, is operated under the supervision of the federal government, although the Indians technically own and work the land themselves.

The life of the Indians before the whites came through the country, makes up one of the most fascinating chapters in the story of North America. While there are thousands of books describing the Indians, we still have in Iowa only the one reservation and the many fine mounds as a visual record of our predeces sor' s original customs at the time when they freely carried on their own life here.

C — THE WHITE MAN' S ERA*

The first whites to lay eyes on Iowa were Joliet and Marquette, who paddled out of the Wisconsin River into the Mississippi on June 17, 1673, and at that time began exploring the eastern border of the state. There followed during a period of a hundred and seventy years, under French and briefly under Spanish sov-ereignty, without formal political organization, the triple enterprise of explora tion. subjection and Christianization of the Indians, and commerce in furs. The lands were held for the King; fur bearing animals were trapped by the hundreds of thousands; and the Indians were driven back by treaty and by force. The white man' s conquest of this rich area had begun, and the way was paved for the epic of colonization to follow.

In 1803 Napoleon sold to the United States the great Louisiana territory, which included Iowa, at a price of about *two and a half cents an* acre. Little record remains of the eighteenth century French life — their navigation, trans portation, commerce, trapping and mining. But the era of occupation which followed the purchase has carried through almost down to the present day.

The early "settlers" came to Iowa mainly from the eastern states and they occupied the territory nearest to the points of entrance. Travelling across Illinois

*Fro≪n notes supplied bjrl.IL Harlan. Curator, State Historical. Memorial and Art Department.

to Galena and Dubuque, and up the Mississippi River from the Ohio, they took their stand in the southeastern section. There they first built cabins and laboriously cleared ground in the wooded river valleys. The prairies were not then deemed suitable for agriculture, and hence every little field had to be hewn out of the forest. But soon the dramatic occupation of the prairies set in, and through a period of about seventy years the tide of sod-huts and primitive farmsteads flowed steadily northwestward until the entire state had been taken up. Plate X (page 27) illustrates the manner in which certain European stocks localized in various sec tions, although a preponderance of Iowa's citizenry has always been native born.

The land-rush went on under such high pressure that not only was the open country subjected to agriculture, but the cutting of woodlands went on rapidly. At one time or another virtually every woods in Iowa has been cut over, and the present forest areas are almost all second and third growth, allowed to come back on land not found profitable for farming. That reforestation process is one which conservation must foster and advance, in the face now of several adverse cir cumstances.

Likewise, the land-hungry settler, desiring all of this rich Iowa soil that he

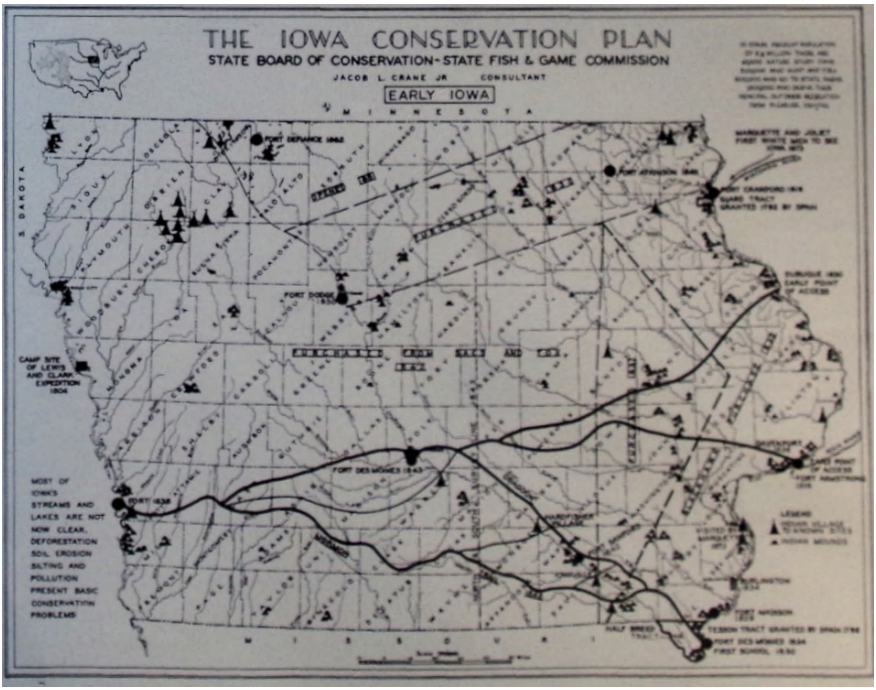


PLATE VIII — INDIAN VILLAGES AND MOUNDS PIONEER TRAILS - PORTS - EARLY SETTLEMENTS

PLATE IX — IOWA IN 1843 — Courteiy of J. N. Darling

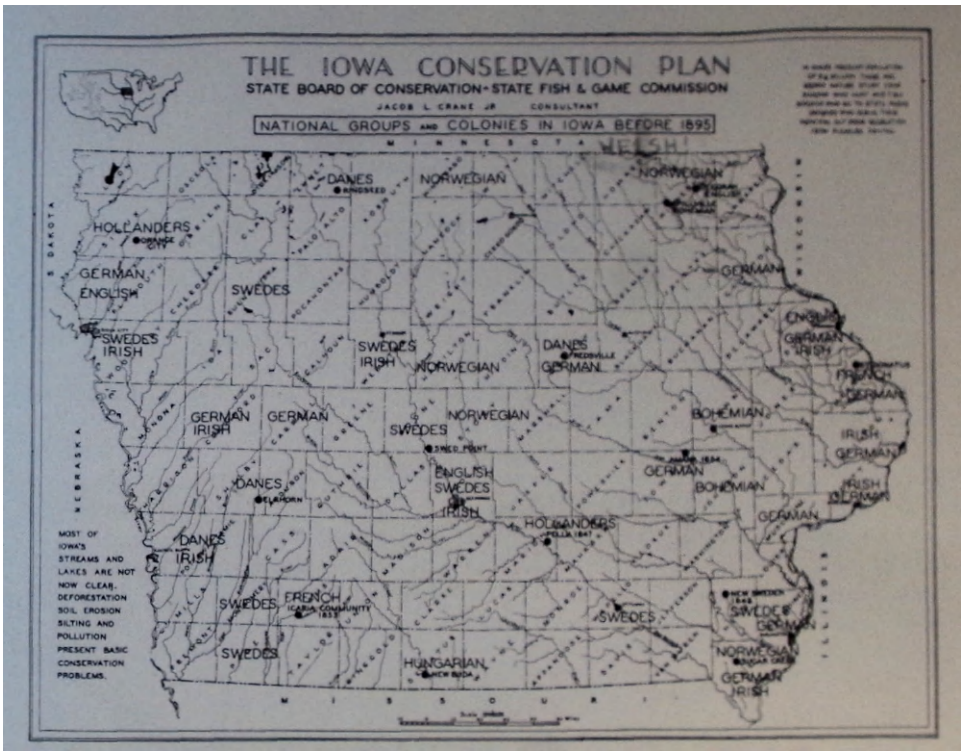


PLATE X - - MANY EUROPEAN PEOPLES ARE REPRESENTED IN IOWA'S POPULATION

could get hold of, proceeded to drain marsh and lake areas wherever that seemed feasible, and tens of thousands of acres of such wet lands were drained out. not always successfully.

Government was organized, towns built up, and highways constructed, rail roads were extended, schools established and the "civilization" period began. The movement for conservation planning is clearly in direct line with the other enterprises of this civilization period.

CHAPTER IV

IOWA AND ITS PEOPLE

A — THE LAND OF IOWA

Within the boundaries of the commonwealth of Iowa there is comprised a total area of approximately 56,147 square miles, of which about 55.586 square miles is land area and the balance, 561 square miles, is water area in lakes and streams. Roughly, one fifty-fourth of the continental area of the United States lies in Iowa. The state is seven times as large as Massachusetts, one-fifth larger than New York, one-fourth larger than Pennsylvania, but only a little more than half as large as Colorado and one-fifth as large as Texas. Iowa has two-thirds the area of England, Scotland and Wales combined, (total population over forty million), and it has five times the area of Belgium, (population about eight million).

No single "civilized" area in the world of comparable size *has such consistently rich land as Iowa.* Ninety-nine per cent of Iowa's land surface is covered with relatively fine soil, while less than half of the United States all told possesses any kind of good soil. Ninety-six per cent of Iowa lands are contained in farms, and of this total almost two-thirds is under cultivation and twenty - seven per cent is pastured, the latter mainly in connection with crop farming. For conservation purposes, the significance of these figures will appear throughout the report, in relation to soil erosion, silting, woodland conservation, the cost of sites, etc., etc.

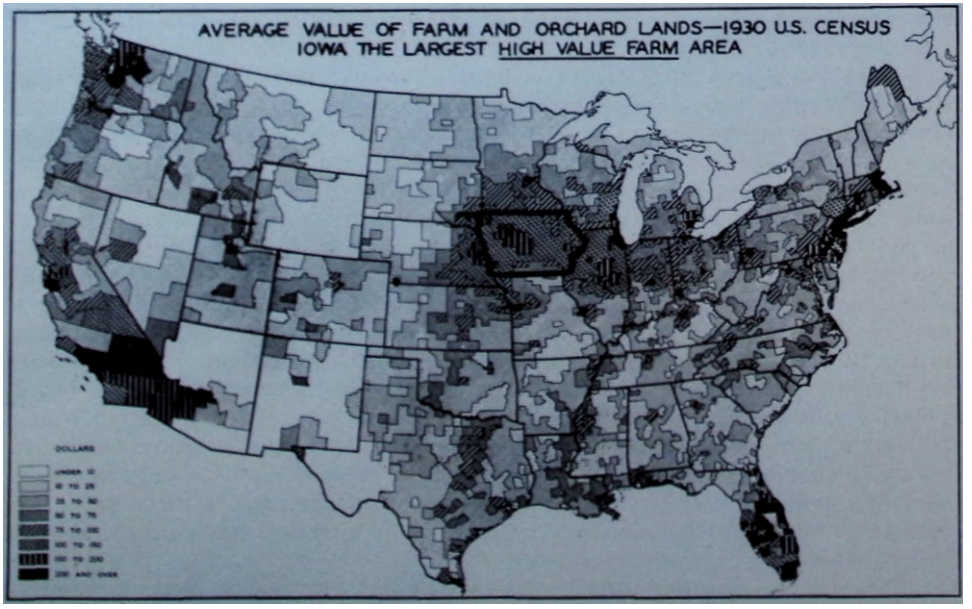
With the exception of certain intensive truck-garden districts around large cities and certain fruit districts in Florida and California, Iowa's farm lands even now hold the highest values in the United States. Most of the states include many millions of acres of land unsuitable or marginal for agriculture, and these lands are held out of farming use or destined to revert to other than agricultural uses. In contrast thereto, the very great preponderance of Iowa lands, by virtue of good soil, favorable climate, and dose-by markets, can continue to compete successfully and hence will remain in farm usage. Even though the tendency for a tremendous total contraction of farming throughout the country is well under way now, we may expect comparatively little of that contraction to take place in Iowa. The general shrinkage of farming has thus far pushed very little Iowa land out of use. Again, this situation has great significance for conservation. Whereas in some states it will clearly be possible, necessary in fact, to restore millions of acres of reverted land to forests or to allow it to lie waste, thus auto matically supplying the circumstances for public reforestation, for erosion control and silt checking, for watershed management, for game and wild life conservation, and for public recreation, so far very little of that process has gone on in Iowa as compared with most of the country.

Nevertheless, certain Iowa trends in changing land use may be counted an advantage to some phases of conservation, and they are, for Iowa, important

trends. In the southern section there is a marked tendency for lands to be transferred from cultivated crops to permanent pasture. This trend seems destined to continue and to affect some additional thousands of acres which have been unsuccessful under the plow, because of steep slopes and erosion. And permanent pasture usually erodes very slowly indeed if the gullies are properly controlled. Likewise, in northwestern Iowa we find a tendency to transfer crop land to dairy uses — forage crops and pasture. Again this trend seems likely to continue within limits and it is favorable to conservation.

In the main, however, Iowa's lands may be expected to remain in typical farm uses; largely cultivated and secondarily pastured in connection with crop farming. We have in Iowa, then, no major land utilization problem in the sense that that problem exists in such states as Wisconsin, Michigan, and many others. To be sure, a land-use plan for Iowa should and will naturally evolve out of the national land utilization planning movement in coordination with the state land and cover survey proposed in Chapter XIII. but it is not so urgent as it is elsewhere in this country.

For the sake of brevity, the probabilities of land reverting to forest and of the restoration to water of unwisely drained lands are left for discussion in the appropriate chapters. Suffice it to say here that while the total will comprise only a small part of the state' s total area, the few hundreds of thousands of acres of land in line for reforestation are an important element in the conservation program.



PLATS XI — RANGE OP LAND VALUES IN THE UNITED STATES. Prom U. S. Census of Agriculture

Not the quality of Iowa' s land and soil but the economic situation of the landholder constitutes the major land utilization problem for conservation pur poses. The one factor most dangerous to application of sensible measure* for the conservation of Iowa' s soil, woodlands and waters derives out of the land holder' s present economic difficulties. The tenure on the land is rendered insecure for owner or tenant by the impact of low prices for farm products, higher prices for factory goods, proportionately high taxes, and unbalanced mortgages. If a farm seems likely to go up soon for tax sale or mortgage foreclosure sale, if the bank or the insurance company or the county or some other owner is going to get the farm at forced sale within a year or two. the present owner or tenant cannot afford to properly rotate crops, save woodlands, and check erosion for the sake of the succeeding title holder. He is forced to get all the cash he can out of the farm at once by plowing all the land possible, planting the immediately profitable cash crops, and selling the trees to commercial buyers. This factor in Iowa' s basic conservation problems cannot be overemphasized.

B - THE LANDSCAPE

This state, situated almost in the geographic center of the United States, is deemed by most Americans to present the appearance of only a great level farm, "the breadbasket of the country," without landscape interest. That impression, gained in good part by second-hand reports of those who have seen Iowa only from the railroad train, is far from the truth. It happens that the east-to-west rail lines, seeking the easiest gradients, do not cross much of the most interesting Iowa country. And of course the north-central third of the state (the Wisconsin Drift area) is generally quite level or gently undulating. But even there the natural lakes, some sixty of them, with their wooded banks and lovely marshes, constitute a very beautiful relief in the intensively farmed districts.

All the remainder of Iowa, except for small areas, is made up of rolling, broken or rough country. Eastward and westward flow the two greatest rivers of the continent, and their wide flood plains, islands, devious channels, and high wild broken bluffs are landscape wonders. Nowhere between the Rockies and the Alleghenies can more spectacular grandeur be found than that along these tre mendous river valleys. Within the state the water courses have cut deep irregular valleys down into rocky gorges. The hills along the streams as well as the bottom reaches are even now usually wooded, and. especially in the spring and autumn, they are remarkable for their varied half-wild beauty. Northeastern Iowa, the geologically oldest part of the state, is a true fairyland of hills and deep ravines, rocky gorges and bluffs, pines, cedars, juniper, birch and hardwood, and old stone villages and mills. At many points this section of the state looks more like New England than it does like the image of Iowa held by most people outside the state.

And when we speak of the farm land of Iowa itself, where most of the open land is cultivated or grazed, we are speaking of a vast, unbelievably rich garden, which in the spring and through the summer is beautiful beyond description. The level upland prairies themselves, with their very green or tawny fields of

corn, under the heavy sunshine or equally heavy rain showers, possess a fine quality of loveliness. Parts of Iowa are beautiful the year around. *All* of Iowa is surpassingly beautiful in spring and early summer.

Conversely, this rich and varied landscape has been damaged unwittingly by some human activities: erosion of the hillsides, timber cutting, pollution and silting in the streams, ugly buildings, billboards, strip mining, ditching, pole lines, and crude railway and highway cuts — all these have worked injury to Iowa's beautiful countryside. Not the least important phase, perhaps in the long run even the most important phase of conservation planning in Iowa is that which deals at many points with the restoration and enrichment of the landscape, the visual environment, with all its significance in satisfactory human living.

C — CLIMATE

The greatest fact about Iowa's climate is the coincidence of growing tempera tures and rainfall in the late spring, plus hot summers and long growing seasons. This climatic condition applied to Iowa's good soil creates its extraordinary pro ductivity. which in turn has led to the use of almost all the land for farming — the

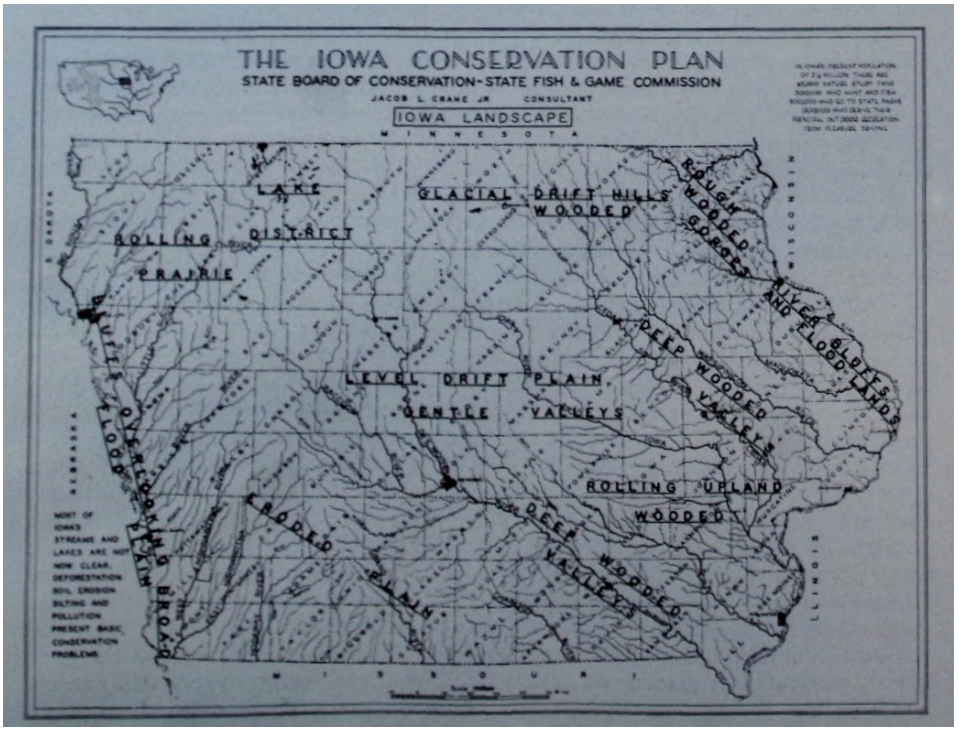


PLATE xn — THE VARIED LANDSCAPES OP IOWA

breaking of nearly all prairie sod and the clearing of nearly all upland woods. And this process has enormously increased erosion and silting, it has destroyed the natural environment for wild things, and it has done harm to the Iowa land scape.

But the same factors, soil and climate, make restoration quick and easy as compared with most states. Here lies conservation's greatest natural aid in the Iowa situation. In most parts of the country a generation is required to restore native growth on the land, while in Iowa a few brief years will generally accomplish an equivalent restoration, with all that that means in checking erosion, cleansing waters, re-establishing wild life, rebuilding recreation places, and re-beautifying the country.

While Iowa's climate is fine for growing certain plants, it is not mild. The extremes of temperature, twenty-five degrees below zero to a hundred above, the violence of rain storms, and the periods of drought have an influence on every phase of life, and they have a definite bearing on the whole conservation plan, for example in such various matters as the need for erosion control and the need for escape from sumnjer heat.

Despite much comment to the contrary, there is no conclusive evidence that Iowa' s climate is changing materially. The cycles may now be recognized, but the present rainfall range and temperature range are not greatly different from the records of the past eighty years. If the climate is changing the change is too slow to definitely identify within the comparatively short period of record-keeping.

Likewise there is no conclusive reason to believe that the periods of flood and of low flow in the streams are in general more severe than they were before the state was settled. In fact the greatest floods known seem to have taken place before Iowa' s prairies were broken and her woodlands cut off. Likewise, the draining of marshes has had only a minor effect on floods and low water. These statements should not detract from the importance of forest conservation and marsh restora tion for other conservation purposes. Further, the *managed* flow from lakes and marshes can be effective to some degree in alleviating extreme low stream flow, and all the water surfaces which can be maintained will beneficially influence the climate, both summer and winter.

D — THE PEOPLE OF IOWA

The Conservation Plan is made for use by the people of Iowa. The composi tion and the distribution of the population, present and future, are therefore basic considerations in preparing the plan.

Iowa is as yet, and will probably remain, a state essentially rural in character. The proportion of the population living in small towns and on farms is now about sixty per cent. While this proportion tends to decrease, it is not likely to reach a figure below fifty per cent. More important, however, the citizen of Iowa, in whatever town or county he lives, is relatively close to rural life, and the thinking and the attitudes of the whole state are vitally conditioned by that fact. (The big-city people of Illinois, or of any state having a predominance of city popula-

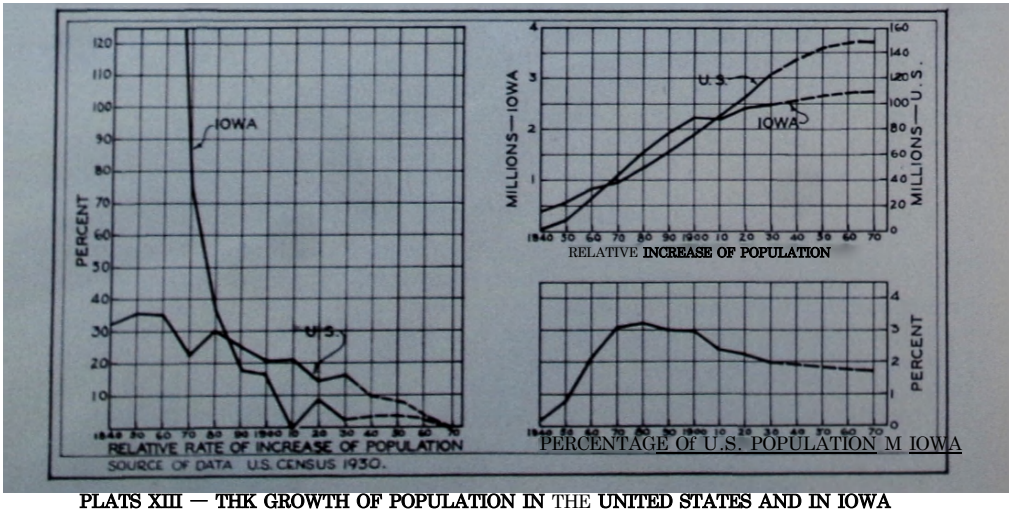
tion. are in the main ignorant of the country and its circumstances.) Herein lies one of Iowa's greatest advantages for purposes of conservation, since conservation, in the sense in which we are dealing with it here, is mainly a project concerned with the larger problems of the state's lands and waters outside the cities. Erosion control, woodland conservation, the balanced use of streams and lakes, the country side landscape, the preservation of wild life, and the development of state parks and preserves are matters touching both the pocket books and the hearts of Iowans as they do in very few other states in this country.

Another factor bringing a strong demand for conservation lies in the rapid occupation of Iowa by the present population. There are many people in the state who can remember, within their own lifetimes, the rich flora and fauna of even fifty years ago. There has not yet been time for the comparative devastation of the original conditions to be accepted as a "natural" condition, and a material proportion of the citizenry keenly regrets the destruction which they themselves have seen going on. They will not rest until every practicable step has been taken to recover a fair measure of the original richness of the Iowa country.

FUTURE POPULATION

The United States will probably not increase greatly in population during the next forty years. It will reach a total of 140 to 150 million*; thereafter it may decline. This is the most important factor in estimating the future population of Iowa. From a running start in 1840, when the state's population constituted only two-tenths of one per cent of the U. S. total, this figure increased to 3.2 per

*A figure in which many authorities now concur.

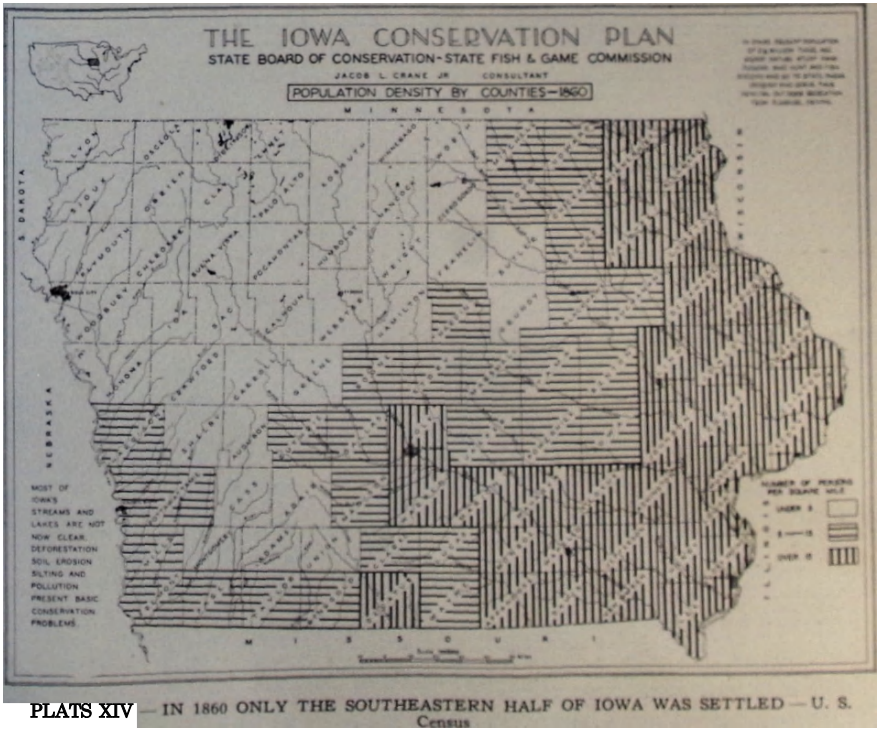


PLATS XIII — THK GROWTH OF POPULATION IN THE UNITED STATES AND IN IOWA

cent of that total in 1880. Since that date the percentage ha* decreased slowly but steadily, as a result of the larger proportionate flow of population into the western states and into the industrial cities. In 1930 about 2 per cent of the population of this country lived in Iowa. In 1970 it is probable that not to ex ceed 1.8 per cent of the U. S. total will be counted in this state. And applying that figure to a national total of 145,000,000, we can probably expect Iowa's popu lation to reach a total of between 2,500,000 and 3,000,000, and a balance to be struck within that range.

Iowa population forecast for 1970, 2,500,000-3,000,000

These figures, calculated as a proportion of the U. S. total, have been checked by a projection of the Iowa population curve and by computations of Iowa's changing age groups. It is very significant that while the rural districts, in con trast to the great cities, have up to the present consistently produced a surplus of population, the birth rates and the age-group ratio for such a state as Iowa tend quite rapidly toward the point where no surplus would be produced and the "natural" increase would change to a decline.



PLATS XIV — IN 1860 ONLY THE SOUTHEASTERN HALF OF IOWA WAS SETTLED — U. S. Census

For fifty years Iowa has been losing population to the big cities in other states. During the past two or three years a reverse movement has been under way with a large flow back to the country villages and farms. With reorganization of the metropolitan worker's economic status this country-ward trek will be checked, and the net result, as nearly as we can appraise it, has been recognized in these forecasts. While Iowa can provide food and shelter for a much larger resident population than the new flow from city to country has thus far promised, it must not be forgotten that two even more fundamental factors have not ceased to operate. First, more Americans prefer to live in cities than prefer to live in the country, and the city-ward migration has in all probability not yet been com pleted. Second, fewer and fewer hands are required to produce the same volume of crops on the farms, and this force is still at work toward reducing the farm population.

Prospects of large industrial expansion have been carefully considered in making these forecasts. National movements of industry and population and the factors affecting them seem to indicate that Iowa is not destined for a major industrial growth. The factory towns will grow somewhat, while the rural popu-

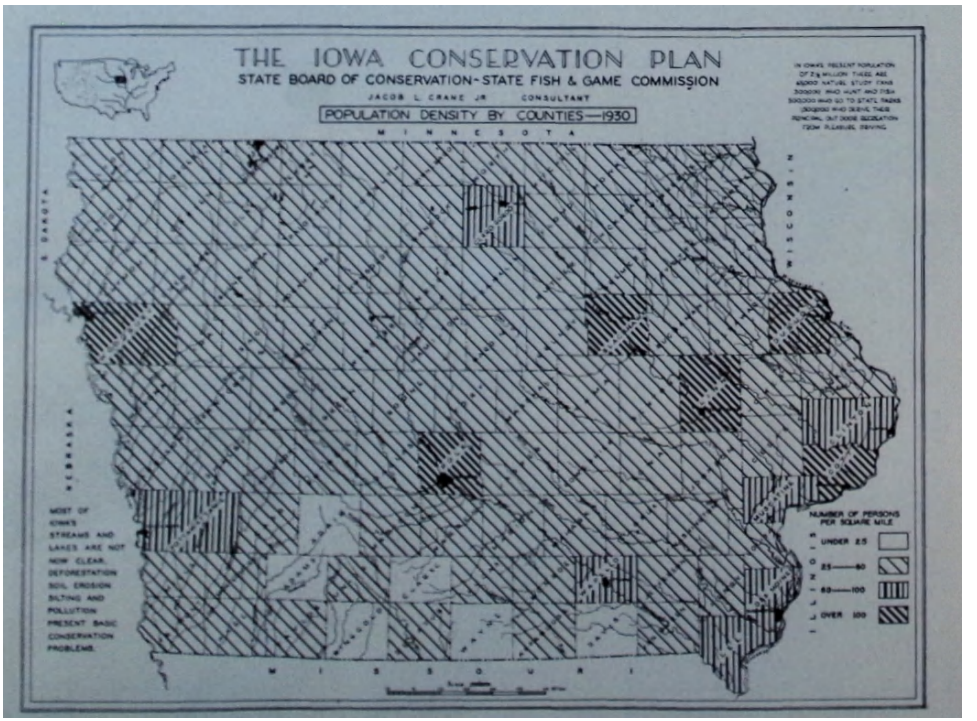


PLATE XV — FAIRLY EVEN SETTLEMENT OVER THE ENTIRE STATE – U. S. Census

lation tends to decline or remain almost stationary, producing the totals now in prospect. But we cannot expect any great movement of industry into Iowa, in view of the powerful forces of invested capital, transport, sources of materials, and markets, which have already set a pattern of industrial localisation on this continent which is not easily to be changed.

All told, Iowa will have one of the best balanced populations in the country.

POPULATION DRIFT IN IOWA

Within the state important changes in the population distribution have been taking place. The occupation of Iowa progressed from southeast to northwest, and the flow in that direction is still going on. *More than half the counties are losing in total population,* and the losses are most marked in the south, east, and northeast. Six southern counties decreased more than ten per cent from 1920 to 1930. This trend is accounted for partly by the competition of northern against southern soils and by the momentum of the flow northwestward. But mainly it is due to the movement during the period 1900-1930 from country to factory town.

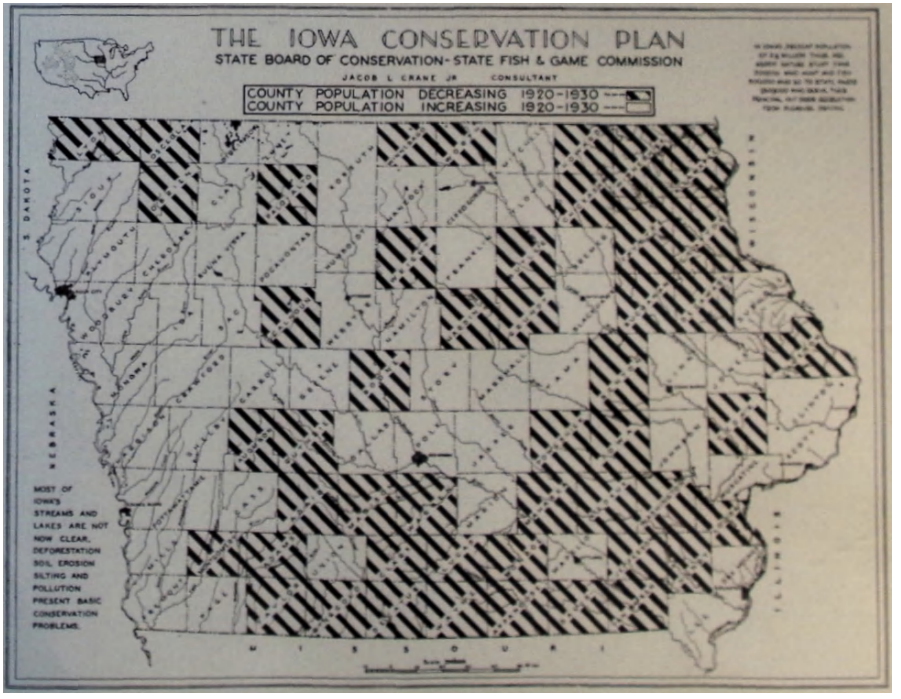


PLATE **XVI — COUNTIES LOSINO OR OAININO POPULATION** 1920-1930 — U. S. Censui NEARLY **HALF** THE COUNTIES DECREASED. MOSTLY IN SOUTHERN AND EASTERN SECTIONS

AH of these factors are reflected in the forecast of density by counties for 1970 shown on the accompanying map. Here is one basis for determining the general locations of lands most likely to be abandoned, and for determining the more precise locations for conservation projects which have a direct recreational service to fulfill.

There is no claim to infallability in any of these population forecasts. New forces may enter the situation to completely upset our present calculations. But for purposes of this report the factors have been carefully weighed, one against the others, in reaching the conclusions given.

E LIFE IN IOWA AS RELATED TO CONSERVATION

The people of Iowa, all in all. are among the richest in the world; but the extremes of wealth and poverty are less marked than perhaps in any other state. There is in Iowa a great degree of state loyalty; and a great degree of cohesion among all the citizens. The biggest and the smallest figures are known to one another, and government is very much influenced by personal contacts. Every-

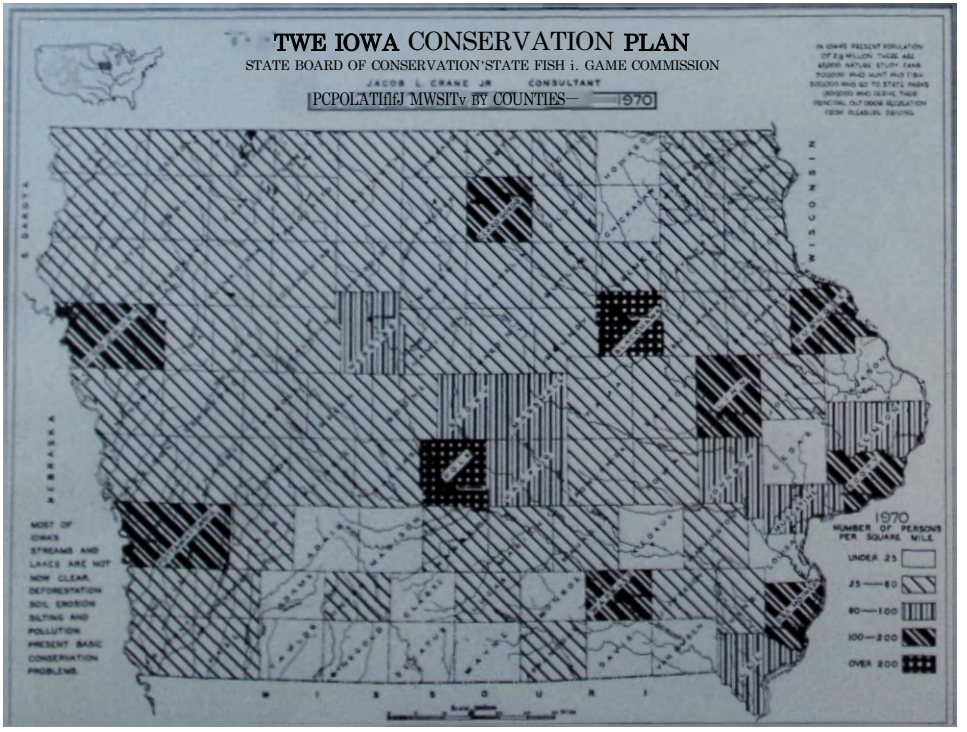


PLATE XVII — SOME SOUTHERN COUNTIES DECREASE WHILE INDUSTRIAL COUNTIES INCREASE IN POPULATION

body understands the life and problems of the countryside; many understand the significance of conservation in its broader sense. All of these items are of the greatest advantage to conservation and state planning in a democracy.

The natural source of Iowa's wealth is the soil. The effective utilisation of that wealth is partially frustrated by the economic situation beyond the fanner's control. Uncertainty of tenure (tenancy, taxes and mortgages) constitute the greatest handicap to secure living and to conservation; and the conservation plan must seek to offer direct economic aid to the farmer.

Iowa's educational plane, literacy rate, and health rate are among the most favorable in the world. Except for the troubles rooted in the farmer's economic difficulties, Iowa's present position and prospects are in all ways good for build ing up a sound, rich life, provided that by conservation and planning the state can save and recover and wisely use its natural endowments.

In considering the state's outdoor recreational program, we have estimated the number of people now engaging in the several main forms of such recreation. We find that there are in Iowa, roughly, 65,000 adult members of organizations interested in nature study; 300,000 who do some hunting or fishing or both;

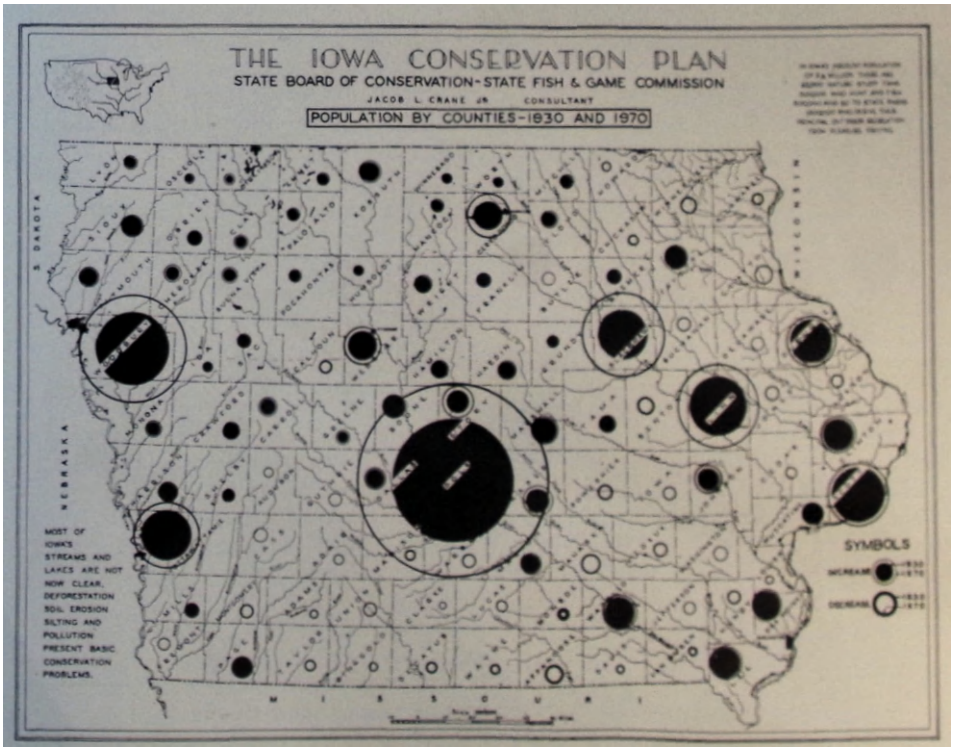


PLATE XVIII THE INFLUENCE OF THE LARGER TOWNS 13 EVIDENT

500,000 adults who use the state parks; and 1,500,000 people who get virtually their only outdoor recreation from driving on the highways. Thus we have some measure of the demand which must be met for different types of state recreation. The tendency seems to be for a proportionately larger number of older people and fewer young people to hunt and fish. The numbers using state parks will increase enormously; the bulk of the state park attendance is made up of people living within forty miles of the park to which they go. The large total which derives its outdoor recreation from pleasure driving indicates the *supreme importance* of well-located, well-developed highways, with good-looking roadsides, roadside parks, and a permanently beautiful countryside to look out upon.

No one can question the tremendous importance to the children of Iowa inherent in a program for achieving sound utilization of natural resources, good recreational facilities, and a beautiful landscape.

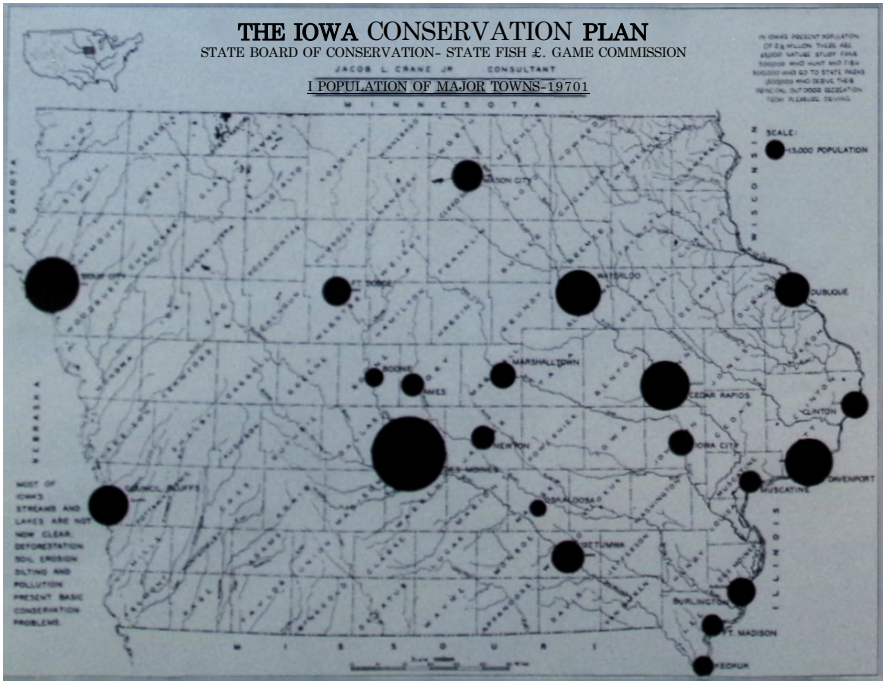


PLATE XIX — THE DISTRIBUTION OF THE LARGER TOWNS FORECAST FOR 1970

CHAPTER V

THE CONSERVATION OF IOWA'S SOIL

SOIL WASTE AND EROSION

Iowa crop and pasture lands are not in all cases wisely used. While the crop production per acre has been mounting with unproved farming methods, and while much knowledge is now applied to the determination of the most suitable crops and the best rotations, two major sets of factors are still at work to destroy the highest usefulness of this richest soil. First, through an attitude which is founded in part on indifference and in part on the necessity for getting as much immediate cash as possible to pay this year's tax and mortgage bills, some land holders abuse the soil by planting the wrong crops or by improperly rotating them, or they overwork the land without replenishing it. These two sources of soil waste fall outside the direct range of conservation planning, since they involve the educational and the larger economic status of the farmer, and are dealt with through other agencies. The conservation plan touches on this problem and it tends to aid the landholder on several points, but the full solution can be reached only by action of educational and legislative forces.

Second, the soil of Iowa is eroding away over almost all of the state, and the erosion is serious over at least half of the state's area. Soil erosion is now recog nized as a national problem. It is reported that seventeen and a half million acres* of cultivated land in this country have been permanently lost through erosion, and that the present rate of erosion may put one hundred million acres out of use within fifty years. Iowa does not suffer in this way as *extensively* as many states, but, by virtue of the value of the soil, erosion in this state is very important. It is not anticipated that all erosion can be stopped by any means.** But a great part of it is susceptible of control and that part we are discussing here.

For conservation purposes, soil erosion in Iowa falls into three general classi fications.

1. Field erosion, in which the landholder has a direct and vital economic interest.

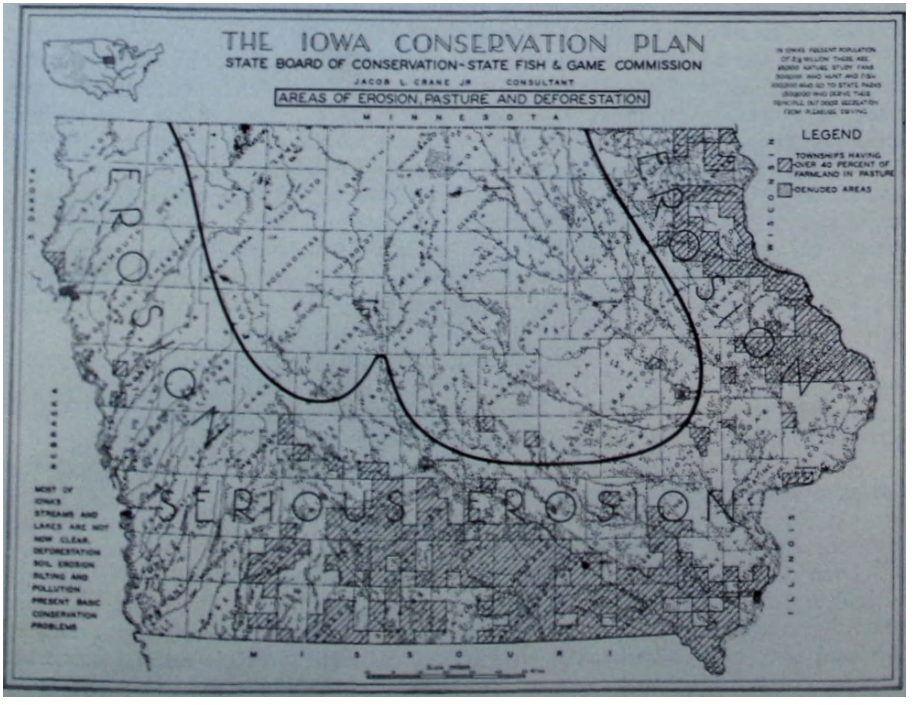
2. Gully erosion which now or soon will eat back into the fields and pas tures and directly affect the landholder's economic interest.

3. Erosion of gullies, stream and lake banks, and waste land, where the farmer is not immediately concerned.

On the first two types of erosion, field and gully erosion which directly af fects the economic success of the farms, much has been written and much work has been done. The federal government, the state government and the state agricultural college have all given a great deal of attention to the problem. It is generally considered that the actual control of this erosion lies in the hands of the land user who is to benefit, and it is considered that his critical economic interest in the matter will cause him to exercise control over such field and gully

*Report of President's Committee on Recent Social Trends — 1933.
** After centuries of control work the Rhine still deposits much silt in Rotterdam Harbor.

washing, provided he believes his tenure to be fairly secure and provided he can be assisted on technical methods through federal and state cooperation. Further, the organization and the procedure for this work are now operating. Near Clarinda in Page County, the U. S. Bureau of Soils and the State College are working together on a farm leased by the state, making elaborate experiments on various phases of erosion control. This is one of the most important projects of the kind in America. In Johnson county, also, a cooperative study of hydrological factors in erosion is under way with participation by the State University and the Iowa Institute for Hydraulic Research. Thus the technique of erosion control is being worked out carefully and intelligently. Equally essential, of course, is the matter of assisting the individual farmer in using sensible erosion control measures. For this field, the Extension Division of the State College, through district erosion control experts and through the county farm agents, is working with the landholders, one by one, to perfect methods of checking soil wash. Altogether, this whole phase of erosion control, that dealing with erosion which immediately affects the farmer' s pocketbook, is well under way, and the conservation plan need not be directly concerned with it. The same values to conser vation. as we are here planning for it, that is, in the control of silting, restoration of



PLATS XX — THE AREAS OP MOST SERIOUS EROSION **COINCIDE WITH THOSE OP DEFORESTA TION. CUT-OVER AND ERODED LANDS OFTEN** GO **TO PASTURE** — State College Bulletin*.

woods and small growth, etc.—these same values derive out of the erosion control project above outlined as out of that described below; but it need not be included in the plan because it is now appropriately taken care of.

The third type of erosion, that which is not a direct economic threat to the farm be cause it is not now damagingfields and pastures, constitutes the principal Soil Conservation pfob- *Problems:* lem for the conservation plan. It comprises mainly the gullying on cut-over waste lands and the bank-wash and gullying along the shores of streams and lakes. It is caused mainly by the stripping of timber from the land (hence it involves one most important phase of woodland conservation), by the plowing of lands too steep for cultivation, and by the uncontrolled action of the streams and lakes against their banks.

Erosion Control *and Reforestation:* ***Public Access*** *to Streams* ***and Lakes; Fisheries***

No one can say just what proportion of the total erosion in Iowa falls in this class, but it is clear from the survey that even after the other types of erosion are successfully checked, as we may expect them to be through the measures now in process — even then the erosion beyond the farmer's present interest or capacity to control will remain great enough to cause immense damage to the streams and lakes, to the lands bordering them, to waste lands, and eventually to the crop and pasture lands themselves.

IMPORTANCE OF CONTROL

This erosion must be checked for the sake of the lands of Iowa. It must be checked to prevent the silting up of streams and lakes and power ponds, both natural and artificial. It must be checked to restore and stabilize spawning beds, and to make possible the control of algae. It must be checked to reduce the burden on streams so they can better care for one of their other legitimate functions, the dilution of *treated* sewage; and it must be checked to reduce the burden on water purification plants.

MEASURES FOR EROSION CONTROL

Erosion of waste lands, stream banks, etc., can be controlled only by planting and other forms of bank protection along the shores of streams and lakes, and by planting on the waste uplands. Various types of planting will be required for vari ous situations: Willows along stream and lake bonks, cottonwoods in river bottoms.

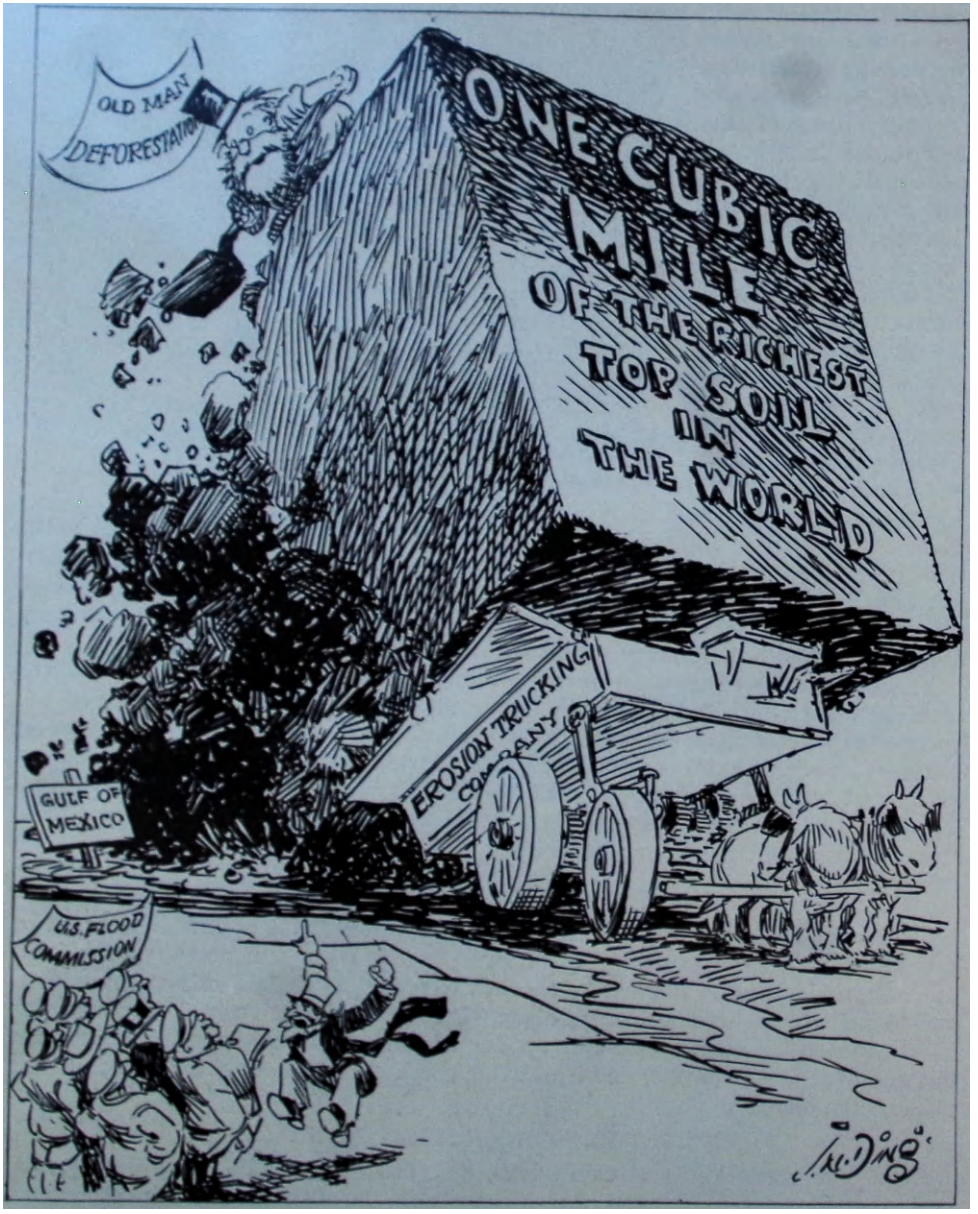


PLATE XXI — THE SOIL OF IOWA IS WASHING AWAY TO THE SEA — Courtesy of **J. N. Darting**

No Individual Landholder Can Control This Type of Erosion

grasses on some slopes, hardwood on cut-over up lands, dense low-growth in other places. At some points the planting will have to be supplemented by da [Tuning, by rock retainers, by cutting back the banks, and so on. All told, this is a huge under taking when we consider the hundreds of miles of streams and lake shores and gullies which are cry ing now for some treat ment. It is not a too difficult job technically. There are a number of men in the state who could simply and directly solve almost every such erosion problem, given a little time and a little assistance from the holder of the land. Mainly, it is a matter of giving nature a chance to establish her own wise balance and stability in the way most appropriate in each situation.

The principal need is for some one agency to assume responsibility for and direction over this long-time project. The treatment of the natural lake shores calls for cooperative action of shore owners under the general supervision of the central agency. (See Lake Improvements, Chapter VI.) Badly washed uplands, of no further use to the farmer, should be deeded to the state, or they will eventually revert, and they can then be planted under staff supervision. Or even previous to the transfer of such lands into public ownership the state by acquiring some rights in the timber crop or other rights, may undertake the replanting. (Chapter VII.)

Stream banks may generally remain in private ownership but by several methods the bank control may be under taken. The staff can assist the owner without the state's acquiring any defi nite right along the Stream. Or easements may be taken by the state

Good Erosion Control by Planting Gutty and Flooring >ith the Contours — Courtesy A. W. Hopkins. College ol Agriculture. University ol Wisconsin

or county to give public access for fishing (see Chapter X) or for trails or scenic drives (see Chapter XII). or for picnic places. In return for such easements the staff may undertake bank protection, largely by planting.

ADMINISTRATION

The immediate question is that of determining the best administrative set-up for this work. The benefits will be very wide spread. The control of this type of erosion is of critical advantage to farm lands, to fisheries interests, to the use of all lakes and waterpower ponds, to recreation, and to public water supplies and sewage disposal. The lower Mississippi valley will benefit from cumulative erosion control in the tributary states. The principal talent for directing such work is now attached to the State College, the Board of Conservation, the Fish and Game Commission, and the County Farm Bureaus. To centralize and give best effect to the undertaking it is suggested that the Board of Conservation head it up, but that it be considered a cooperative project in which the several agencies above named join forces. Whatever the outcome of any reorganization of the conservation agencies, a division which can handle erosion control and forest con servation (including reforestation) should be established, since these two lines of work are so closely inter-related. This proposed division should not encroach upon the activity of other agencies, but should collaborate with them for more economical and more effective work. The duties of this division should be largely advisory and administrative and it should co-ordinate and manage the project of checking erosion where the landholder cannot be expected to exercise control of his own initiative.

The general land and cover survey (Chapter XIII) will clarify the whole program enormously and it will better determine the points most urgently requiring treatment, in addition to those already known. Meanwhile, in separate memo randa. specific recommendations are being made on situations where the job can be started. The policies and methods to be used in this field will develop more fully in the manner that experience dictates.

It should not be forgotten that every site project in the conservation plan constitutes an erosion control area. Each state preserve and state park, each game refuge and sanctuary, each managed lake and artificial lake, will offer opportunity for some experience in checking erosion.

More important, the whole conservation plan in its closely coordinated un dertakings will aid erosion control all along the line. The lake and river banks have been mentioned. Woodland conservation (Chapter VII) and reforestation in particular, are directed definitely toward checking and preventing erosion. The game and wild life programs, dependent as they are on restoring cover in the draws and odd comers of farms throughout the entire state, will eventually have a great effect on checking soil wash. The ultimate land utilization plan will estab lish new areas for pasture, hay crops, and forests, and these types of and use in themselves constitute erosion control measures.

The whole erosion control project, originating in the need for conservation of the soil and branching out into its many ramifications, is basic and essential to the conservation plan.

CHAPTER VI

THE CONSERVATION OF IOWA'S WATERS

"Civilization" in its earlier stages has been causing the progressive ruin of the state's waters, above-ground and to some degree underground. Protection and conservation of this basic resource is fundamental to the very life of the state. A large, long-term program, both within the conservation plan and outside of it, is necessary to accomplish these purposes.

A — UNDERGROUND WATERS

Deep Ground Water

The sedimentary rock strata of Iowa, covered by glacial drift and wind-blown loess, carry water which flows generally in the direction of the slope in the strati fication. Far down among these strata a series of sandstones are heavily impreg nated with water which can be drawn from the porous rock when it is tapped by wells. The pressure of the water in the sandstone forces it up toward the surface through the well; sometimes out to the top of the ground, (artesian wells), some times within reach of pumping machinery. These sandstones lie comparatively near the surface in northeastern Iowa and they tilt toward the southwest, carrying the underground flow with them in that direction. Their water burden impreg nated these strata further to the northeast, in Wisconsin and Minnesota, where they come near enough the surface to take in direct rainfall and percolation. The movement of this water toward the southwest is so slow that that which reaches the surface through wells in Iowa is known to have fallen on the land as rain out side Iowa literally centuries ago. As it works its way south westward through the dense rock, it is cleansed of organic impurities and at the same time it dis solves minerals, so that it reaches us pure but highly mineralized. Since the water-bearing strata are near enough to the surface to make well-drilling feasible to reach them in most parts of Iowa, this source is most important for municipal water supplies. Tilting to the southwest, these same strata get too deep for general use in the western and southwestern districts, which therefore must de pend upon shallower sources for water supplies.

The deep-well waters, dean and often inexpensive to utilize, constitute an invaluable resource for those sections where they are available, even though they require de-mineralizing treatment to be entirely satisfactory for domestic and industrial use. In some instances, they are wasted. Flowing wells are al lowed to run uncapped when they are not in use; and in certain localities the draft upon the water is too heavy, too many wells drawing from the same pool. Here is a conservation problem of importance to some neighborhoods, and it may be come increasingly important. The state should assume responsibility for the control of the abuses, since the public interest is definitely involved. Legislative authority is indicated for the State Geological Survey, working in conjunction

with the Board of Conservation, to exercise supervision and control over the use of deep-well waters.

Shallow Ground Water

The sand, gravel and clay deposited by the glaciers on top of the sedimentary rock virtually all over Iowa, the glacial "drift," and also the upper loess deposits, collect part of the precipitation which falls on the surface and carry it under ground to the lakes and streams. The level of this ground water rises and falls with the rise and fall of the land (maintaining an hydraulic gradient for flow to the surface water courses), and it rises and falls with the increase and decrease of rainfall and snow fall by seasons and periods of years. This constitutes the com paratively shallow underground "water table," although the volume of water carried in the drift and loess varies with the local circumstances. Springs are created by the emergence of this ground water at a point above stream level. Over all but the western part of Iowa the glacial drift underground supply can be tapped and brought to the surface in varying qualities by shallow wells, "drift wells." which range up to a hundred feet in depth and more, but which are usually

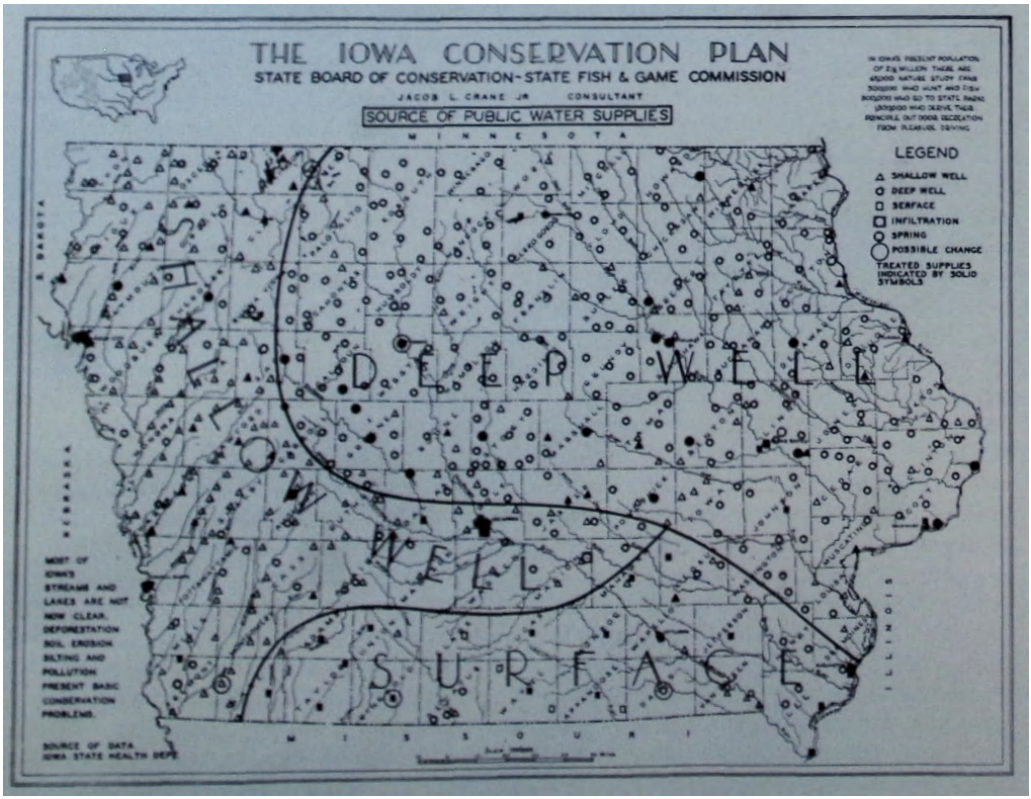


PLATE XXII — THE GROUND WATERS ARE LIMITED IN QUANTITY - SOME CITIES PARTICULARLY IN THE SOUTHERN AND SOUTHWESTERN AREAS MAY HAVE RESORT TO IMPOUNDED SURFACE SUPPLIES

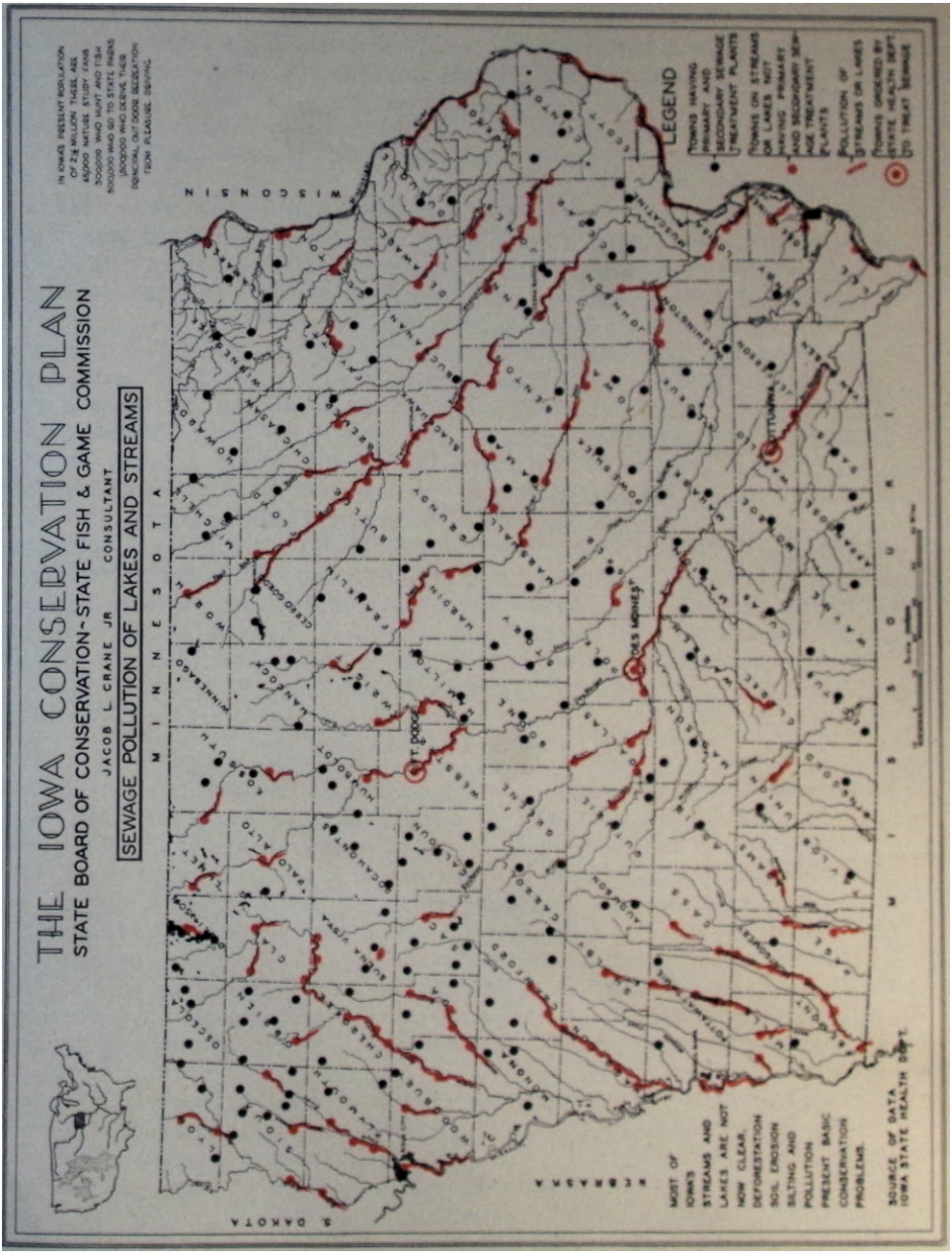


PLATE XXIII — STREAM AND LAKE POLLUTION BY SEWAOE A MAJOR PROBLEM IN THE CONSERVATION OP SURFACE WATERS

less than a hundred feet deep. In a western section the water carried in the loess above the drift must sometimes be depended upon, and in a southern section the shallow ground water resource is so meagre that some towns have had to resort to surface supplies. Shallow wells generally furnish the water supply for individual domestic use (farms, etc.,) for the entire state, and they furnish the municipal supply for most towns in the western section, as well as at scattered points elsewhere.

The water is usually not hard. But its quality is limited in any one situation. And it is sometimes endangered by pollution from crude methods of sewage disposal. The latter is a Health Department problem. The rational use of the available supply may require technical administration by the State Geological Survey working in conjunction with the Board of Conservation.

There is some disagreement among authorities as to the recession of ground water levels due to heavy drafts upon them and to the drainage of marshes and farm lands. This whole matter needs much more detailed study than the geological survey, with its limited funds, has been able to carry out. It seems clear that the deeper grounds waters are adversely influenced locally by some wasteful flowing wells and by too heavy drawing through wells placed so close together that the pool cannot supply all of them. The principal influence on the shallower ground waters is unquestionably the fluctuation of rainfall, and it is probable that the draining of farm lands and marshes has had only a minor effect if any, except in the immediate neighborhood of the drained areas; and this influence has in most cases been beneficial to the agricultural lands; even though the draining of some marshes now turns out to have been a blunder from the economic and conservation points of view.

B — SURFACE WATERS

There are three general classes of surface waters in Iowa: lakes, marshes and streams. Each class constitutes an invariable resource to the people of the state.

The sixty-three live lakes of Iowa are supremely valuable for recreation, including swimming and boating, in a few cases for public water supplies,* for fishing, for water fowl, for their cooling effect, for stock watering, for ice, for stream flow regulation, for their favorable influence on air moisture and rainfall, and not least for their effect in the landscape.

The marshes are valuable for waterfowl, song birds and upland wild life, for their beauty in the landscape, for their influence on stream flow, for fur-bearers, for their great botanic and zoologic interest, and for their favorable effect upon the climate.

Iowa's rivers are of outstanding value for water supplies, for sewage dilution, for fishing, for waterfowl and other wild life, for swimming and boating, for stock watering, for navigation (on the two big rivers), for hydro-electric power, for sand and gravel, and for the pleasure they give in the Iowa landscape and particularly where the people can find recreation near them.

*Riparian rights probably have the right to draw water supplies from state lakes, but only under state control and that control may include licensing.

It is impossible to say which are the more important uses. The conservation problem is to devise a *balanced* utilization of these surface waters, so that each legitimate use may take its proper place along with the others.

The Rosy Past

Many believe that Iowa' s lakes and streams in the early days were crystal clear, untroubled by low water or by floods, full of game fish, and in all ways more desirable than they are now. This is only partially true. In particular it appears certain that the periods of low water in the lakes and marshes and in the flow of streams came along as regularly a hundred years ago as they do now. And we know that heavier floods *happened* to take place before than have occurred since the complete occupation of the state.* Likewise, while the fishing has been terribly damaged at some points, it has been helped at others by human activity. Further, the silting of streams and lakes has been going on for thousands of years; almost the entire modeling of the Iowa land has been caused by erosion during the period since the ice sheets receded, and the water courses in the past have carried an unimaginable volume of silt in sluicing away the wash which created the valleys.

Damage to Rivers, Lakes and Marshes

Nevertheless, enormous damage has been done to the surface waters in the brief period of the white man' s life here. *

Drainage has witlessly destroyed some wonderful lakes and marshes now proven of no use for agriculture.

Erosion has been tremendously accelerated by breaking the prairie tod and cutting off the woods, and silting in the waters has been correspondingly ac celerated to a very serious degree.

Sewage pollution has at some points far over-reached the legitimate use of rivers for *dilution*, and sewage disposal has been unwisely allowed to appropriate lakes to its purposes. Likewise, it has damaged the normal biological balance in some fine marshes.

Ditching of water courses has reclaimed farm land to the detriment of wild life along those streams.

Some dams have aggravated silting and damaged the beauty of river courses.

Intensive stock watering in some situations is a major factor of pollution; and barnyard wash likewise contributes to pollution.

Perhaps most important of all. private ownership of abutting lands has cut off public access from these incomparable recreational assets, the lakes and rivers.

In the whole project of correcting these abuses and of achieving a balanced, conservational use of the surface waters, the Iowa Conservation Plan has a double function. First it should undertake to *assist* other agencies, public and private, on the following remedial measures.

1. Abatement of Sewage Pollution. The Health Department and the Executive Council are the state agencies directly authorized to treat this problem.

• It may be that the frequency and severity of minor floods and low stages have been more pronounced than for merly, but the dearth of long term record* and the extreme complexity of the factor* operating render this a matter of speculation.

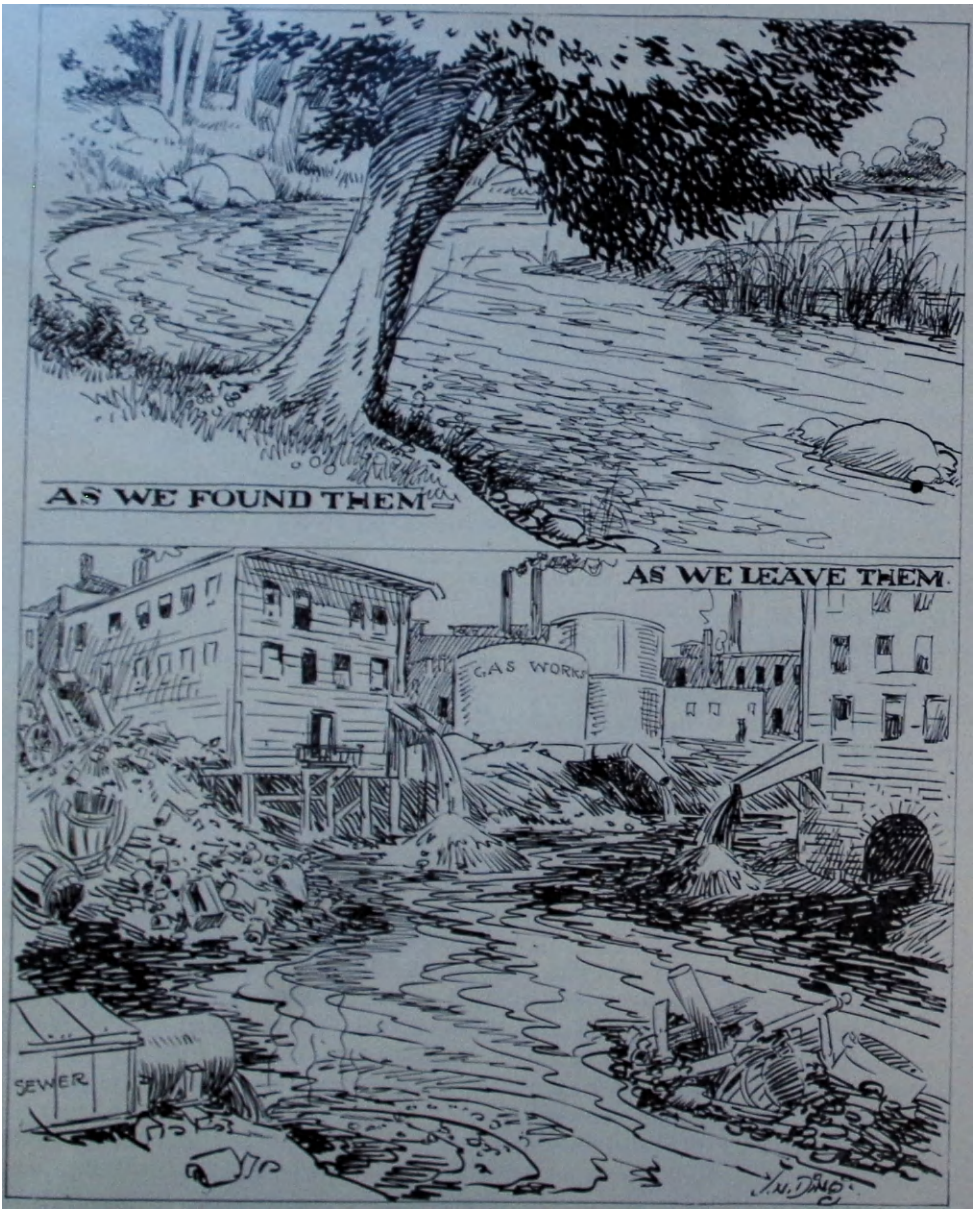
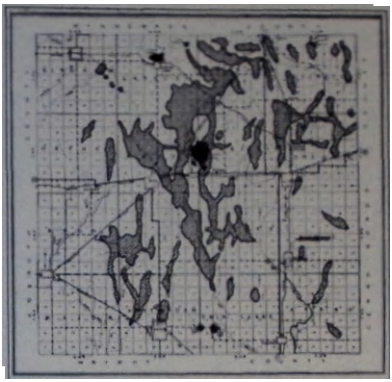


PLATE XXIV — AN IOWA RIVER BEFORE AND AFTER — Courtesy of J. N. Darling



ORIGINAL AND PRESENT WATER AREAS Of HANCOCK COUNTY
ORIGINAL PRESENT

PLATE XXV — AN OUTSTANDING EXAMPLE OF MARSH DRAINAGE
Hu.bingcr's Atlas 1873

Nearly every town in Iowa must eventually purify its sewage, either partially or com pletely. (See suggestion relative to Sanitary Water Board in Chapter XIII.)

2. Control of Erosion and Silting. (See Chapters on Soil Conservation and on Woodland Conservation, and section C of this chapter, on lake improvements.)

3. Water Power Development. A "water power policy" has been prepared for the guidance of the two commissions, along with other state agencies, (particularly the Executive Council) in exercising informed judgment in passing on power dam proposals, to prevent damage and to secure the in herent benefits for conservation.

4. Pollution by Stock and Wash. Con trol of lake pollution due to stock watering, etc., by assistance to adjoining owners on the best means to fence shore lines, and to divert and obstruct the flow of barnyard wash into the lakes and streams, by trenching, etc. (See section C of this Chapter.)

The Conservation Plan should undertake, as part of its *direct* activities:

1. The Restoration of Drained Lakes and Marshes, where practicable. (See Chapters on Wild Life, on Hunting and on Fishing.)

2. The Improvement of the Existing Lakes. (See section C, this chapter.)

3. The Construction of New Lakes. (See chapters on Fishing and on State Preserves and Parks.)

4. The Provision of Public Access along the shores of streams and lakes. (See chapters on Soil Conservation, Fishing and State Preserves and Parks.)

The first set of projects, those involving collaboration with other agencies, are proposed to be taken up by both the Board of Conservation and the Fish and Game Commission. No personnel will be required beyond that recommended to handle the other elements of the conservation plan.

A full statement of the projects to be undertaken directly by the Board and the Commission is given in the sections of this report referred to above, and hence are not discussed in detail here. Study of the other sections will bring out the manner in which the various items have been closely inter-related all along the line.

The Mississippi and the Missouri

These navigable, inter-state rivers are under federal jurisdiction. Other sections of this report describe certain proposals along their banks.

The nine-foot channel proposed in the Mississippi and the possible future similar proposal in the Missouri are beyond the complete control of these com missions. Two facts, however, are now evident. First the channel in the Mis sissippi will in all probability not seriously damage "conservation" all things con-

sidered. and it may do some good. The project may damage or destroy some forms of fish life, but even that is not yet perfectly clear, and it will probably im prove conditions for the fur-bearing mammals. *It will change but not neces sarily hurt the landscape beauty of the river.* Here we face the same transi tion from wilderness country to civilized country that has taken place on the Rhine, the Rhone, the Danube, the Hudson, etc., etc. Second, the canalization in each instance must be watched carefully in order to adjust state projects to changed conditions. Nothing included in the present recommended conservation plan for state action will be invalidated by the river canal projects in so far as it is now possible to anticipate their effect. The federal government plans for this work are far from complete at this time, and hence it is not possible now to ap praise the effects in detail. In the whole matter of conservation on the Mississippi, it is most important that erosion and silting be placed under control and that sewage pollution be corrected.

The Missouri River canalization may be viewed in much the same light as that on the Mississippi, expect for this additional consideration: the construction of storage reservoirs on the upper river to equalize flow will have a decidedly

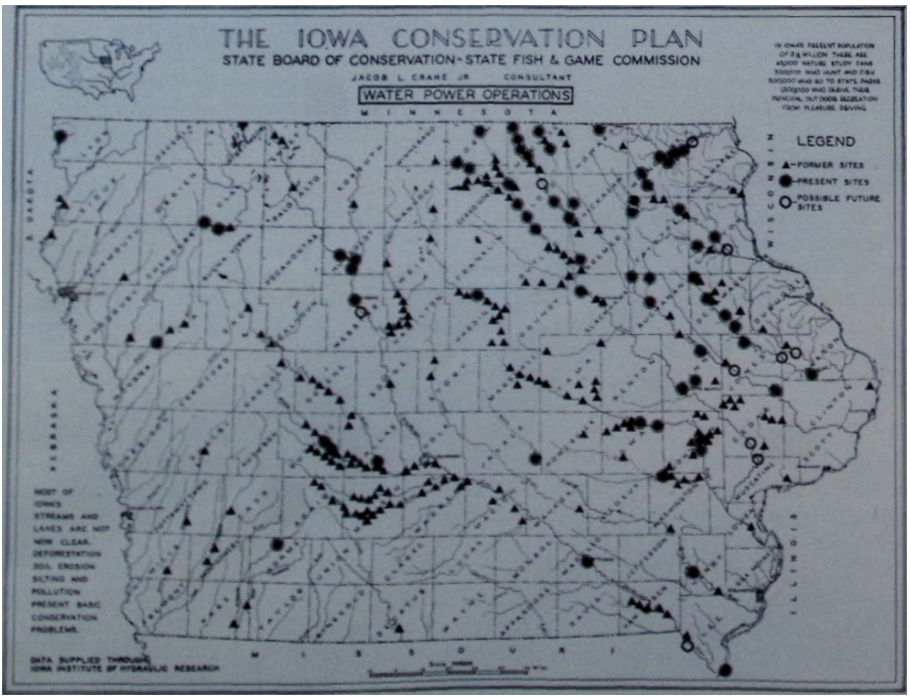


PLATE XXVI — IN 1873 THERE WERE SOME 500 WATERPOWER DAMS IN THE STATE. NOW THERE ARB ABOUT 70 BUT THEY PRODUCE MORE POWER THAN THE 500

beneficial influence upon the Iowa river front in stabilizing river levels, spawning - beds, marshes, etc.

No one would say that these great rivers in their ‘ ‘natural” state were ideal for wild life or for landscape conservation, with their constantly changing chan* nels, bank cutting, raging floods, dead low stages, wide mud flats, etc. Altogether, the conservationist need not fear their “improvement,” provided it is carried on with due respect for other factors beside the engineering - that is, the other conservation factors.

C — IMPROVEMENT OF STATE LAKES

The natural lakes of Iowa constitute one of the state’ s most wonderful assets. As pointed out above, they are of incomparable value for recreational purposes; they offer the finest fishing and the finest refuges for water birds; they cool the hot winds of summer, temper the spring cold, and add humidity to the dry summer atmosphere; they serve as storage to equalize stream flow; a few find economic usefulness for water supplies, and many are used for ice-cutting, and for stock watering; they are enormously interesting from the biological standpoint; and they comprise one of the loveliest features in the landscape.

They have been greatly damaged. Several valuable lakes were unwisely drained to no good purpose. Uncontrolled erosion of banks and on drainage areas has deposited silt on the bottoms of most of the lakes, and this has been aggravated by such heedless acts as taking natural rock protection barriers away from the shores. The silt deposits are in no small measure responsible for the unbalanced biologic condition and growth of algae. Some have been unwisely used for disposal of municipal sewage, to their great detriment from every standpoint, in cluding the algae nuisance. Stock watering and barnyard wash have contributed largely to this pollution. The intensive occupation of adjoining lands has cut the public off from access to these finest public playgrounds.

In order to bring together in one place the measures recommended for im proving the natural lakes to make them most useful and beautiful, an outline is here given for each lake. The improvements fall generally into several classes.

First, the water levels should be controlled at a number of the lakes, in order to stabilize shore lines, beaches, spawning beds, marshes and other acquatic vegetation, to the advantage of every human activity and of all wild life. Both legal and engineering problems are involved and neither are easy of solution. A first step is a survey to determine property and lake boundaries, and to collect records of previous water levels. A second is to devise the procedure for legally establishing and controlling the level of the lakes. (See Legislation. Chapter XIV). The third is the control structure, which in most cases will be simple and inex pensive, generally a spillway with manual operation of flash boards or some other device. Usually the program would be to store surplus water behind dashboards during fall and spring rains and to discharge that surplus under control during winter and late summer low-flow periods, thus better maintaining the lake level during the critical hot months and also increasing stream flow when it is most needed for sewage dilution, fish life, etc., in winter and summer. In some cases

THE. IOWA CONSERVATION PLAN

STATE BOARD OF CONSERVATION* STATE FISH &. GAME COM MI ⁴s im

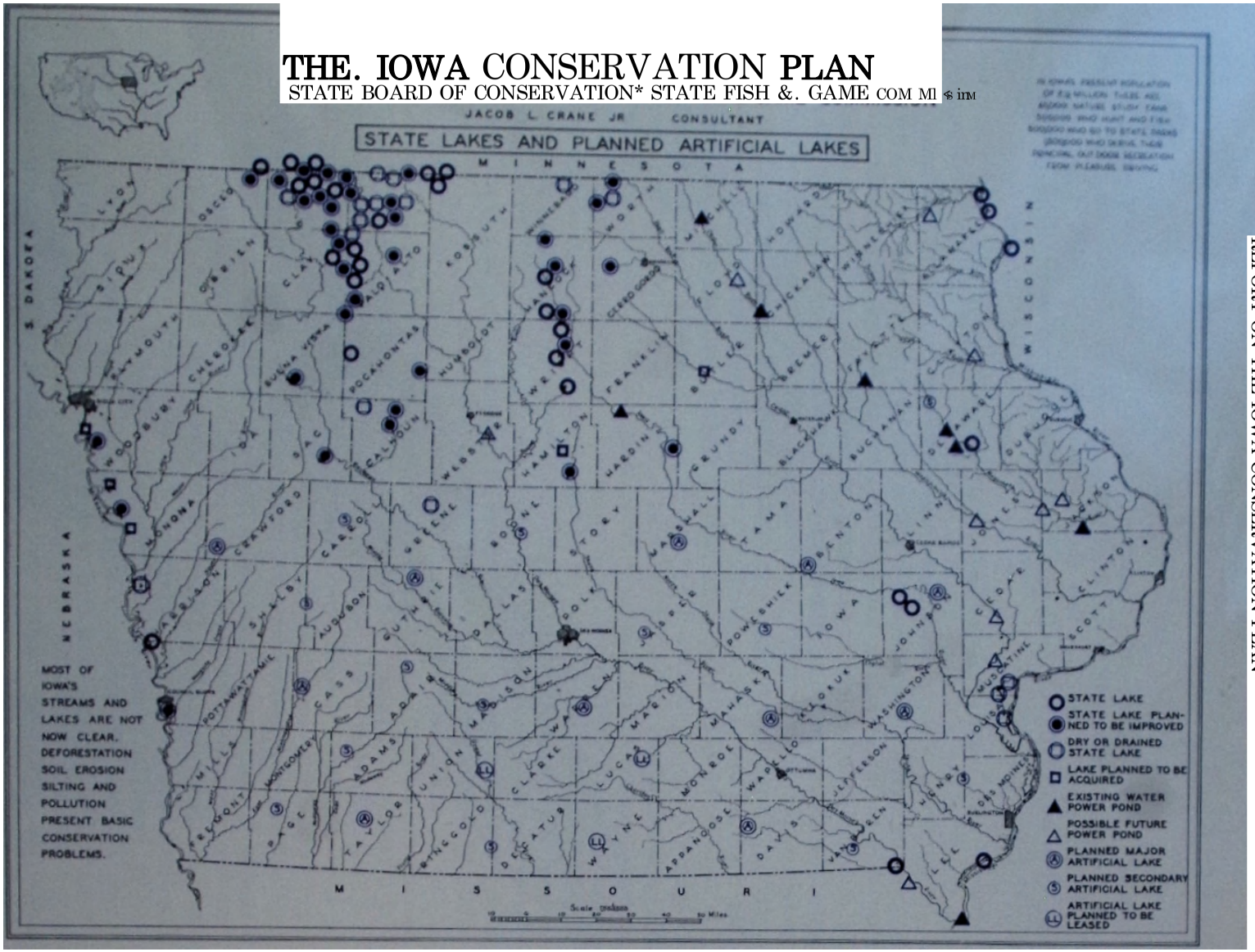


PLATE XXVII — IOWA' S GREATEST RECREATIONAL ASSET — THE LAKES

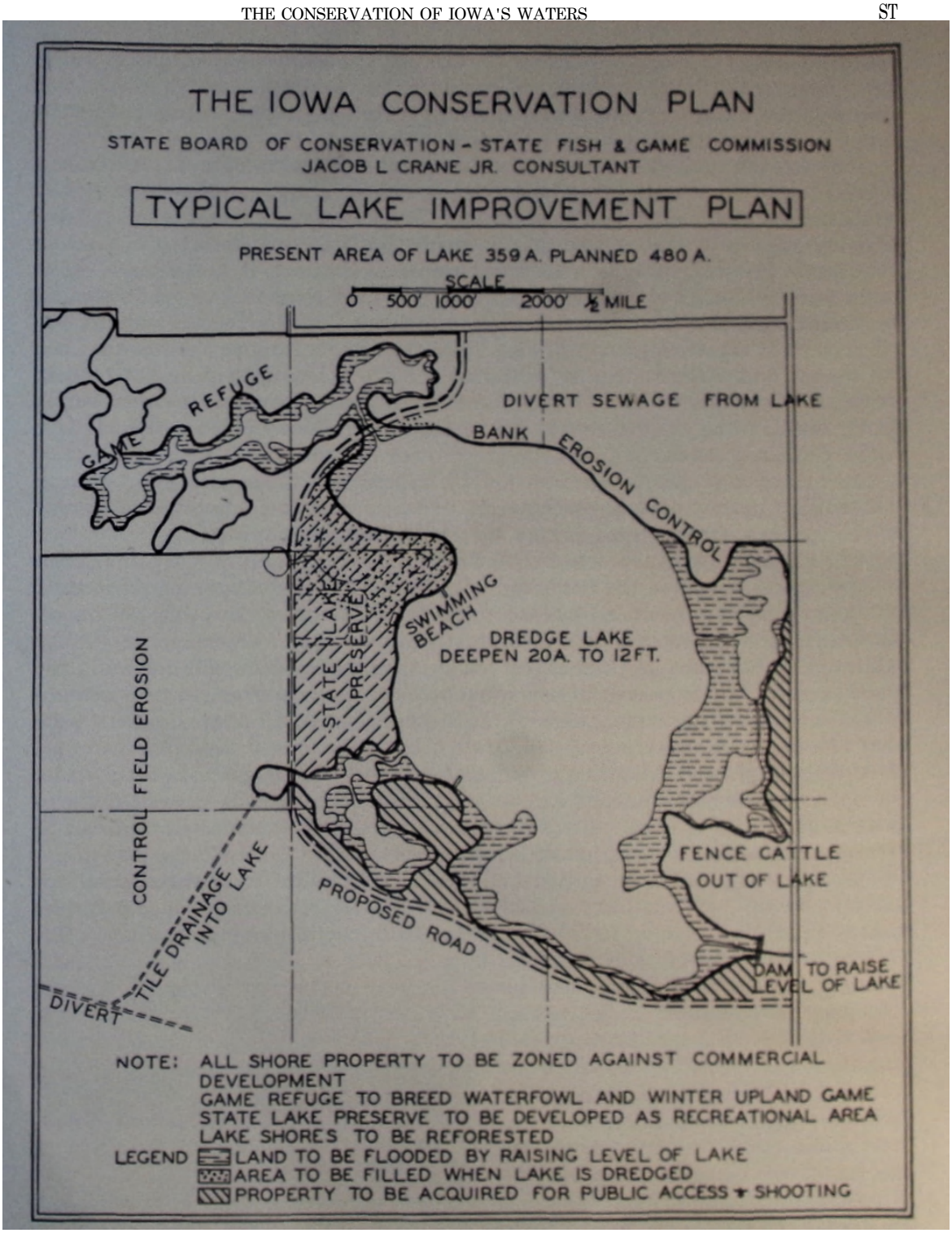


PLATE XXVIII - COORDINATED IMPROVEMENT FOR FISHINO - WATERFOWL UPLAND OAME - WILD LIFE AND PUBLIC RECREATION NOTE VARIOUS KINDS OF IMPROVEMENT

the maintenance of levels by outflow control may be supplemented by increasing the inflow to the lake, through the recapture of diverted drainage water and other lost run-off water. Details are given in reports separately submitted to the Board and Commission.

Second, the survey forces the conclusion that dredging should be undertaken in some twenty-five state lakes. All told this is a big and expensive job and is recommended only after the most careful consideration. These lakes require dredging because no other means is available for restoring them to a suitable condition. Primarily this is a fisheries problem, although it has several other important aspects. For successful fish life, the lakes tend to become too warm in summer, deficient in dissolved oxygen, unbalanced in the chain of aquatic life with resultant excessive growth of algae, and they are getting so shallow that the fish cannot find shelter either in winter or summer. Dredging promises to help correct all these difficulties. Deeper water tends to be cooler and to offer better shelter both during the recreation season and under the ice. Once the silt and sludge deposit is removed, at least in part, there will be a much better chance of re-establishing a proper balance of aquatic vegetation, to keep down the algae and to keep up the oxygen content. It is considered that whatever other im provements are made to these unique Iowa lakes, they cannot in these twenty-five cases be successfully managed and used for fisheries purposes until they have been dredged. And of course the dredging, with the effects to be anticipated from it and from other measures, will make these lakes far more desirable for public recreation, for the property owner, for water supply, and as elements of beauty and interest. In many of these lakes, however, dredging alone will not bring the desired results; hence it is definitely recommended that *no dredging be under taken* in such a situation (for example at Storm Lake) *until there is assurance that the other necessary things will be done.* Further, it is emphasized that *no dredging should be started* at any lake until soundings have been made, nor until the biologist, fisheries expert, engineer, etc., have all approved the pro gram in detail. It is hazardous to tamper with these lakes before all that can be known in advance is determined with reference to the probable effects.

Third, sewage pollution must be eliminated. In only two or three situations is it now serious. (Storm Lake and East Okoboji), and there the sewage pollution cannot be held responsible for all the difficulties in the lakes by any means. But no lake in Iowa can be otherwise than seriously injured in the long run by emptying sewage into it. treated or untreated; and sooner or later all such pollution will probably have to be corrected. The job must be done mainly by the municipalities, clubs and individuals which empty sewage into the lakes; by diverting or otherwise disposing of the effluents. There is no vested right to contaminate these

***A Beautiful Iowa Water-Power** Lake*

lakes, no right by previous use or otherwise. While the sewage pollution is not the most serious problem, it is in a few situations sufficiently serious to justify the recommendation that no comprehensive lake improvement program (dredging, etc.,) be undertaken until this matter is in process of being cleared up.

Fourth, in some cases less, in some cases more serious than the pollution by sewage, the fouling of lake waters by cattle and hogs and by the wash from barn yards is an offense to the public interest in the lakes. Each lake must be ex amined in detail and reported upon in the same way that several already have been (Prescott). The remedial measures comprise fencing out the cattle and. by ditching and diversion, the control of washing from barnyards and pastures. The private owner must ordinarily undertake this work as his share in this phase of conservation, but he must have assistance from the state authorities the Board of Conservation.

Fifth, there is no great purpose in dredging the lakes if they are to be allowed to fill up rapidly again. All feasible means should be taken to check future silting. Banks should be protected by planting, by cutting back, by rock or other rip rapping where necessary; and the tributary watersheds should come under erosion control. Again, the land owner is the naturally responsible agency to effect these measures, and again he will require technical assistance from the Board of Con servation. The planting of trees and shrubs around shores of lakes will be very useful from other standpoints than that of checking bank erosion. Such vegeta tion tends to interrupt the winds and hence to reduce wave action on the banks and on the bottom. It offers shade for fish along the lake margins. And it beautifies the lakescape. From the scenic standpoint a good situation is created when cottages, etc., are screened from vew by vegetation as one looks across a lake, the views from the cottages out to the lake being preserved by small open ings through the ranks of trees and shrubs. At a number of the lakes, the tree planting should extend back over the neighboring unfarmed land, to check erosion, to add beauty to the scene, and to harbor wild life in many forms.

Sixth, the imbalanced biological condition of several important lakes, notably Storm Lake and Spirit Lake, must be brought under control. The most offensive and destructive manifestation of biological unbalance in these lakes is the exces sive growth of bluegreen algae, but their presence is only one link in the long chain of biological sequence. The measures required for the restoration of a reasonable biological status in these lakes, including the elimination or checking of algae, involves not one but several points of attack, in which the most impor tant factor is that guidance by skilled biologists will be required at every step. The corrective measures include: dredging where soundings show accumulations of silt and sludge, to remove these too-fertile beds and to deepen sections of the lakes; elimination of sewage pollution and checking of silting; control of pollution caused by stock and by barnyard wash; the introduction of such algae-consumers as gizzard shad; the introduction of larger aquatic plant forms; the maintenance of lake levels during hot periods; and the use of copper sulphate as a corrective treatment, but not as one to be depended upon alone. In the statements on individual lakes listed below, "algae control" is given to mean treatment for

general biological control including the control of algae, and the treatment must be determined by study and observation on each lake as a separate problem.

Seventh, relatively few of the state lakes are now provided with adequate state-owned shore land for public access to them, and this situation constitutes an important problem for the conservation plan. Shore lands are needed for various purposes, depending upon the character of the lake and its principal use fulness. At some lakes the main requirement is for general recreation purposes or to preserve and make accessible the beauty of the shore and the view across the water. Proposed sites in this class are recommended among the state pre serves and state parks, cr among the suggested roadside parks or county or local parks. In other situations the main purpose of public access is to permit hunters or fishermen or both to reach the shores and the body of the lakes. Finally, at many of the lakes, shore lands are needed for waterfowl refuges and nesting grounds, for upland game wintering places, for better management of fish spawn ing grounds, or for wild life sanctuaries. These uses overlap to some degree, some of the proposed shore acquisitions being designed to serve several or, in some cases, all of the purposes named. It is not feasible to make public in this report the details of the shore land recommendations, but supplementary reports cover them.

Eighth, if and when the state has acquired the lake shore properties planned for public ownership and use, there will remain in private hands the great bulk of the shore frontage. The appropriate usage of these private shore lands is a matter of great concern both to the state and to the individual owners. These lakes, it must not be forgotten, are the property of all the people of the state, and their value for public purposes cannot be overemphasized. That value may easily be damaged, and damaged seriously, by inappropriate private uses around any lake. Likewise, the value of any private shore land can be injured by the heedless action of some other private owner. In either case, a beautiful lake is damaged by ugly or too obtrusive developments, principally commercial operations, road houses. shabby resorts, billboards, outhouses, etc. To give a basis for guiding the use of shore lands in a manner equitable to all concerned, it is recommended that legislation be secured granting authority for the Board of Conservation to pass upon all commercial uses of lands on the shores of state lakes in the future. This control is called "zoning" in the statements given below.

Ninth, and last in the list of lake improvement projects, highways are needed and are destined to be built around sections of some of the lakes. In sup plementary reports, suggestions are made for the location of such roads. Their con struction will lie largely in the hands of state and county highway authorities and not directly in the hands of the conservation agencies. But they must be con sidered and kept in mind in determining the plans and the sequence of develop ment in each lake improvement.

It is obvious that these various improvements are not separate but closely inter-related items, and that a comprehensive program must be followed for each lake in order that the several items will be properly coordinated and will follow in proper order. No specifications can be definitely set down to cover all the

lakes, since each one has its own special problems and emphasis. The whole lake improvement schedule requires the integration of several specialised techniques and also the careful exercise of good judgment. Each lake calling for improvement has been studied by several members of the staff, and the following statements are the result of the findings to date. They are not final, but rather suggestive of the treatment to be undertaken.

Total number State Lakes and Lake Beds — 79.

Number of live State Lakes — 64.

Number of dry State Lake Beds — 15.

Total area live State Lakes, approximately — 42,000 acres.

Total meandered area dry State Lake Beds 4,407 acres.

Smallest live State Lake — (Silver, Delaware County) 45 acres.

Largest live State Lake — (Spirit) — 5,684 acres.

Number of State Lakes on which Board of Conservation now controls some shore land outside lake bed - - 13.

Number State Lakes on which Fish and Game Commission now controls some shore land outside lake bed — 7.

Total recommended to have public shore land 47.

Total recommended for important lake improvements, approximately 37.

The lakes are listed by alphabetical arrangement according to the *counties* in which they are situated. The volume of dredging indicated is only a *rough approximation* based on the best data now available and upon the judgment of the technical staff, but it must be checked and modified for each lake by sound ings *before any dredging is done.* All legitimate present and future uses of the lakes are considered in the recommended improvement program for each one. The notation following statement of depth indicates area of shore land *now owned* by Board of Conservation (B of C) or Fish and Game Commission (F and G). All the lakes here recommended for improvement, with their marshes, and with their public shore lands (wherever existing or proposed) will have to some degree all of the values credited to state lakes and marshes at the beginning of this section C — Surface Waters, except that only certain of them will be valuable for fishing and only a few of them for public water supplies, and except that certain of them will have *outstanding* value for general recreation. Hence, in the notations be low, following the depth or the statement of shore lands, indication is given *if after the improvement, the Jake will have high fishing value* or *high general recreational* value or value for public water supplies, and *all* of the other values are to be taken as inherent in the lake improvement project.

TENTATIVE STATEMENT OF IMPROVEMENTS RECOMMENDED FOR STATE LAKES

1. *Mud Hen Lake* - Allamakee County. Depth four to five feet. Fishing. In the Mississippi bottoms. Pending completion of the plans for the river canalization, dredging and possibly other improvements in this and the other similar lakes *(Big Lake No. 1, Big Lake No. 2, and Kaina Lake*) should be kept in mind.

2. *Pickerel Lake*— Buena Vista County. Area 171 acres. Depth four to six feet. Fishing. Banks are generally high with some timber. Water too shallow to winter fish. Bottom silted, (1916 survey).

Problems: Dredging, level control, cattle pollution, silting, acquatic vegetation, public access, zoning.

Improvements: Dredge 200,000 cubic yards, deepen twenty acres to twelve feet. Improve spillway at outlet, acquire public access, fence out cattle, zoning.

3. *Storm Lake* Buena Vista County. Area 3,080 acres. Depth seven to nine feet. Shore land B of C eighteen acres, F 8s G 251 acres, (marsh, game refuge). Great value for all purposes. Open water, generally high banks. Well located to serve a large population. 1916 survey shows bottom *partly* silted. The most important *lake improvement* project.

Problems: Silt and sludge, sewage pollution, cattle pollution, bank erosion, other silting, algae, lack of acquatic vegetation, public shore land, zoning, public water supply, level control highways.

Improvements: Dredge 3,000,000 cubic yards, deepen 1,000 acres two to three feet; cost to be divided among Fish and Game Commission, Board of Conservation, town, and abutting property. New spillway at outlet eighty feet long; water-level gauge at outlet; diversion of sewage effluent; highway around south side; bank erosion control and some back-land planting; planting aquatic vegetation; introduction of gizzard shad; zoning property within 200 yards of lake; acquisition additional shore lands; control stock pollution.

4. *North Twin Lake* — Calhoun County. Area 509 acres. Depth six to eight feet. Shore land B of C fifteen acres. Fishing, general recreation. Narrow lake about two and one-half miles long. At the north end the shores are low and flat. The south and southeast shores are well marked, with some timber. The lake attracts large crowds and is worthy of improve ment.

Problems: Dredging, cattle pollution, bank erosion, other silting, highways, forestation.

Improvements: Dredge 480,000 cubic yards, deepen 100 acres to ten feet; fence out cattle; plant larger aquatic vegetation; reforest shores; highway extended along east shore; acquire more shore for public access; zone around shores.

5. *South Twin Lake* -Calhoun County. Area 596 acres. Depth five feet. Fishing. Shallow lake with generally low banks and few trees. It lies immediately south of North Twin Lake and is now used mainly as a waterfowl refuge, but after improvement would be valuable for fishing.

Improvements: Dredge 400,000 cubic yards,* deepen forty acres to eleven feet; fence out cattle: acquire land for public access; zone around shores; plant trees and food patches for game.

6. *Clear Lake* — Cerro Gordo County. Area 3,643 acres. Maximum depth twenty feet. Shore lands B of C twenty-seven acres, F 8s G hatchery. Great value for all purposes.

Saucer-shaped lake a little over four miles long. The water is clear and relatively cold. Sand beaches and wooded shores make this lake one of high recreational value. A large part of the land around the lake is subdivided into small lots for the town of Clear Lake and summer cottages.

Problems: Sewage pollution from cottages, etc., cattle pollution, silting, public access, zoning, public water supply, level control, outflow regulation.

Improvements: Install outflow level gauge; fish screen to be moved back from the spillway; future level control; elimination of sewage pollution; fence out cattle; control silting; zone around shores; acquire more land for public access.

7. *Dan Greene Slough* — Clay County. Area 285 acres. Depth two to three feet. Long narrow slough with rather well marked banks on east side. West side very low. The bottom is black silt, shown by 1916 survey. Lake is suitable only for waterfowl refuge.

Problems: Level control, cover and food patches, public access.

Improvements: Plant cover and food patches; improve spillway at outlet; fence out cattle; acquire land for public access.

8. *Elk Lake* — Clay County. Area 261 acres. Depth five feet. Fishing. Attractive lake with gently sloping banks and some trees. There is a deep deposit of silt on the bottom, shown by 1916 survey.

Problems: Dredging, level control, cattle pollution, silting, public access, zoning, fores tation.

• The dredging here is open to same question.

Improvements: Dredge 400,000 cubic yards, deepen forty acres to eleven feet; fence out cattle; acquire public access; plant trees around shore; spillway at outlet; aone around shores.

9. *Trumbull Lake*— Clay County. Area 1,190 acres. Depth five feet. Fishing.' A clear open body of water with gravel beaches and generally well defined wooded banks A large slough enters the lake on the east and a smaller one on the west. *Round Lake,* a shallow marshy area lies immediately to the south.

Problems: Dredging, cattle pollution, public access, zoning, level control.

Improvements: Dredge 380,000 cubic yards, deepen forty acres to ten feet improve outlet spillway, acquire land for public access; zoning around shores; fence out cattle.

10. East *Okoboji* — Dickinson County. Area 1,875 acres. Depth twenty-four feet, at south end, eight feet at north end. Shore land FkG hatchery. Fishing, recreation. Narrow lake about six miles long. It forms the outlet for West Okoboji and Spirit Lakes. The banks are high and well timbered.

Problems: Sewage pollution, cattle pollution, bank erosion, public access, zoning, high* ways, algae.

Improvements: Eliminate sewage pollution, fence out cattle; zone around shores; acquire land for public access; highway around south, east and west sides.

11. *Hottes and Marble Lakes* — Dickinson County. Area Hottes Lake 312 acres; Marble Lake 175 acres. Depth four to six feet.

These two lakes connect and drain into Spirit Lake. The banks are high and have con siderable timber. The lakes are valuable as wild life refuges and for public shooting. The 1916 survey shows that the bottoms are partly silted.

Problems: Dredging, public access, zoning.

Improvements: Dredge outlets; acquire land for public access; zone around shores.

12. *Prairie Lake* — Dickinson County. Area 105 acres. Depth four feet. Fishing.

The lake is practically divided by two timbered ridges. The part west of the ridges is very shallow and muddy. The eastern portion has open water. The banks of both sections are high. The 1916 survey shows that the bottom is silted.

Problems: Level control, cattle pollution, bank erosion, other silting, public access, zoning.

Improvements: Dam outlet; fence out cattle; plant banks; acquire land for public access; zone around shores.

13. *Silver Lake* — Dickinson County. Area 1,096 acres. Depth five to seven feet. B of C now acquiring shore land. Fishing, recreation.

A pretty open body of water with high wooded banks on three sides. On the south side the banks are low and open with some swamp land. 1916 survey shows that there is a thick layer of silt on the bottom. The city of Lake Park lies along the northeast shore of the lake

Problems: Dredging, cattle pollution, bank erosion, other silting, public access, zoning, public water supply.

Improvements: Dredge 500,000 cubic yards; deepen fifty acres to twelve feet; fence out cattle; plant banks; acquire land for public access: zone around shores.

14. *Spirit Lake*— Dickinson County. Area 5,684 acres. Depth twenty to twenty five feet. Great value for all purposes. Clear open water with generally well defined banks and scattered groves of timber. Numerous small lakes and sloughs are connected with the lake. It has high recreational value though it has not been developed as much as West Okoboji.

Problems: Sewage pollution, cattle pollution, algae, public access, zoning, level control, highways.

Improvements: Eliminate sewage; fence out cattle; check algae: acquire land for public access; zoning around shores; construct permanent spillway at outlet: highway around north and east side; install flow-level gauges at main inlet and outlet. The possibility should be in vestigated of cutting off the underground flow from Spirit to West Okoboji by sheet piling

15. *Swan Lake* Dickinson County. Area 298 acres. Depth four to five feet Fishing

The lake is divided by a county road. West of the road the lake is a shallow marsh with low bare banks. The east half of the lake is very attractive with high wooded banks.

Problems: Dredging, cattle pollution, zoning, public access.

Improvements: Dredge, 300,000 cubic yards. Deepen twenty acres to twelve feet; fence out cattle; zone around shores; acquire land for public access.

16. *Upper mnd Lower* Car *Lakes* and *Minnewaahta Lake*—Dickinson County. Meandered as part of East Okoboji. Depth of Gar Lakes four to six feet. Minnewashta depth maximum twenty feet. Fishing. Irregularly shaped lakes that form outlet for the Okoboji, Spirit Lake system. Banks generally high and well wooded.

Problems: Public access, zoning, sewage pollution.

Improvements: Install outflow-level guage; acquire land for public access; zone around shares, eliminate sewage.

17. *West Okoboji* - Dickinson County. Area 3,788 acres. Maximum depth 132 feet. Shore land two and five-tenths acres B of C. seven acres F & G. Great value for all purposes.

Irregularly shaped lake nearly six miles long. Banks are high and in many places wooded. The water is dear and comparatively cool. It is the most important recreational lake in Iowa. The shores are mostly lined with cottages, hotels, etc.

Problems: Sewage pollution, cattle pollution, *public access,* zoning.

Improvements: Eliminate sewage; fence out cattle; zone around shores; install automatic recording guage of lake level; acquire public shore land.

18. *Four Mile Lake* Emmett and Dickinson Counties. Area 219 acres. Depth two to four feet. Fishing.

The banks of the lake are well defined and fringed with timber. The water is almost en tirely grown up with rushes. The 1916 survey shows that silt and decaying plants form the bottom.

Problems: Dredging, cattle pollution, erosion, public access, zoning, level control.

Improvements: Dredge 200,000 cubic yards, deepen twenty acres to ten feet; fence out cattle; plant banks; acquire land for public access; zone around shores; spillway at outlet.

19. *Mud and High Lakes* — Emmett County. Area Mud Lake 363 acres; High Lake 431 acres. Depth Mud Lake four to seven feet; High Lake four to six feet. Fishing, recreation.

Both lakes have generally well marked banks with patches of timber. There is a fine piece of timber land lying between the two lakes. Large swamps connect the lakes. Both lakes have a deep layer of silt on the bottom, shown by the 1916 survey. They are good waterfowl areas and Mud Lake has some fishing.

Problems: Dredging, cattle pollution, silting, public access, zoning.

Improvements: Dredge Mud Lake 500,000 cubic yards, deepen fifty acres to twelve feet; fence out cattle: plant shores; zone around shores; acquire land for public access.

20. *Tuttle Lake* Emmet County. Area 2,816 acres, 981 acres in Iowa. Depth five to six feet. Shore land B of C eighteen and eight-tenths acres. Fishing, general recreation.

Irregularly shaped lake lying between Iowa and Minnesota. The shores are sandy and the banks high and wooded in places. Other sections are pasture land near the lake level. The lake is used only by hunters and fishermen.

Problems: Level contro', outflow regulation, public access, zoning.

Improvements: Regulation of outflow; installation of level-outflow guage; acquire land for public access; zone around shores: planting, bank protection, erosion control.

21. *West* ***Swan*** *Lake* - - Emmett County. Area 1,038 acres. Depth six to eight feet. Fishing.

Irregularly shaped lake about two and one-half miles long. In many places the banks are sharp and covered with timber. At the southwest end a large marsh area enters draining Mud Lake. The 1916 survey shows that the bottom is a layer of silt over the Wisconsin drift. It is a good hunting area with some fishing.

Problems: Dredging, cattle pollution, silting, public access, zoning.

Improvements: Dredge 400.000 cubic yards, deepen eighty acres to ten feet; fence out cattle: plant shores; acquire land for public access; zone around shores. It has been suggested that the outlet spillway be raised, but this does not seem worth while.

22. *Little Wall Lake* — Hamilton County. Area 230 acres. Depth three to six feet. Fishing, recreation.

Water surface largely grown up with rushes. Banks good with some timber on east side. West side slopes gradually down from the highway. 1916 survey shows bottom portly silted. The location of this lake along a major highway makes it valuable as a recreational area.

Problems: Dredging, cattle pollution, silting, public access, son inf.

Improvements: Dredge 400,000 cubic yards, deepen forty acres to twelve feet; fence but cattle; plant shores; acquire land for public access.

23. *Crystal Lake* — Hancock County. Area 274 acres. Depth six to seven feet. Fish ing, recreation.

A very attractive lake with high wooded banks except at west end. The water is open and dear. 1916 Highway report shows from two to seven feet of almost liquid mud on the bottom below which lies sand and gravel.

Problems: Dredging, cattle pollution, silting, public access, zoning.

Improvements: Dredge 400,000 cubic yards, deepen forty acres to twelve feet; fence out cattle; plant shores; acquire land for public access; zone around shores.

24. *Eagle Lake*- Hancock County. Area 906 acres. Depth five to seven feet. Shore land B of C twenty-seven acres. Fishing, recreation.

Shallow lake with considerable low marshy land along shores. Some timber is found on the higher banks along the western side. There is a deep deposit of silt and decaying plants an the bottom underlaid with blue clay and gravel, as shown by 1916 survey.

Problems: Dredging, cattle pollution, silting, public access, zoning.

Improvements: Dredge 400,000 cubic yards, deepen forty acres to twelve feet: fence out cattle; plant shores; acquire additional land for public access.

25. *East Twin Lake* Hancock County. Area 193 acres. Depth four to five feet, Fishing, recreation.

A pretty open body of water with high wooded lands on the north and south sides. The 1916 report shows the bottom silted.

Problems: Dredging, cattle pollution, silting, public access, and zoning.

Improvements: Dredge 200,000 cubic yards, deepen twenty acres to twelve feet; fence out cattle; plant shores; acquire land for public access; zone around shores.

26. *Blue Lake* — Monona County. Area 918 acres. Depth five to fifteen feet Shore land B of C 315 acres. Fishing, recreation.

Horseshoe shaped lake over six miles long. It is an old cutoff of the Missouri River. The south and western parts are shallow and filled with vegetation. The location of the lake gives it high recreational value.

Problems: Dredging, silting, water supply, zoning.

Improvements: Dredge 300,000 cubic yards; deepen thrity acres to twelve feet: plant shores; zone around shores.

27. *Rush Lake* Osceola County. Area 359 acres. Depth three to four feet Fishing, recreation.

In its present condition the lake gives the appearance of a swamp. The water surface is over half covered with rushes. The 1916 report shows the bottom silted.

Problems: Dredging, water supply, cattle pollution, silting, public access, zoning, level control.

Improvements: Dredge 200,000 cubic yards, deepen 20 acres to twelve feet: divert tile drainage into lake; construct spillway at outlet; fence out cattle; plant shores; acquire land for public access.

28. *Lost Island Lake* Palo Alto County. Area 1,260 acres. Depth twelve feet. Shore land B of C twenty-seven and six-tenths acres. Fishing, recreation

A very attractive lake with generally high banks fringed with timber. It is almost round and of uniform depth throughout the main body of the lake.

Problems: Sewage pollution, cattle pollution, bank erosion, other silting, public access, zoning, level control, algae, highway.

Improvements: Eliminate sewage: fence out cattle; plant banks: acquire land for public access; zone around shore; improve spillway at outlet; introduce gizzard shad and other algae control; develop highway around lake.

N. *Medium Lake* Palo Alto County. Area 991 acres. Depth three to five feet- Fishing, recreation.

Irregularly shaped lake about four miles long. Generally good banks with scattered groves of timber and several wooded islands. The 1916 report shows the bottom silted. The town of Emmetsburg lies at the south end of the lake and owns some lake shore property.

Problems: Dredging, cattle pollution, silting, public access, zoning.

Improvements: Dredge 200.000 cubic yards: deepen twenty acres to ten feet; fence out cattle: plant shores: zone around shore; acquire shore land.

30. ***Rush Lake*** Palo Alto County. Area 460 acres. Depth four to five feet. Shore land B of C sixty-two acres. Fishing, recreation.

Banks are well defined and considerable timber is found along the south shore which is now in a state preserve. The lake affords cover and feeding grounds for waterfowl but it is too shallow for game fish. The 1916 report shows the bottom silted.

Problems: Dredging, cattle pollution, silting, zoning.

Improvements: Dredge 200,000 cubic yards, deepen twenty acres to ten feet; fence out cattle: plant shores; zone around shores.

31. *Lizard* ***Lake*** Pocahontas County. Area 268 acres. Depth four to five feet. Fish ing. recreation.

A nice body of open water. The banks are well marked with several groves of timber on the east and south sides. On the east and west sides there are considerable areas at about the water level that drain into the lake through narrow openings in the banks. The 1916 report shows the bottom to be hard clay and gravel.

Problems: Dredging, if feasible, cattle pollution, reforestation, public access, zoning, level control.

Improvements: Dredge 400,000 cubic yards, if feasible; deepen forty acres to ten to twelve feet; repair existing spillway; fence out cattle; plant shores; acquire land for public access; zone around shores; plant aquatic vegetation.

32. ***Lake Manawa*** — Pottawattamie County.

A large shallow cut-off in the Missouri bottoms near Council Bluffs. Excellent waterfowl lake, fair for fishing, and valuable for recreation. Recently acquired by state. Improvements now in process to be completed according to adopted program of diking, dredging, acquisition of shore land, etc.

33. ***Blackhawk Lake*** — Sac County. Area 957 acres. Depth six to seven feet. Shore land F At G 142 acres (game refuge). Fishing, recreation.

An irregularly shaped lake about two and one-half miles long. The banks are high, ex cept at the east end, with several groves of timber. The city of Lake View lies at the west end of the lake and numerous summer colonies are scattered around the shores. The 1916 report shows about three feet of mud on the bottom.

Problems: Dredging, sewage pollution, *cattle pollution,* silting, public access, highway zoning. Algae appeared in 1932.

Improvements: Dredge 960,000 cubic yards; deepen 200 acres to ten feet; eliminate, sewage; fence out cattle; plant banks;acquire land for public access; zone around shores; high way along north and south shore; and possibly dam the inlets to collect silt, etc., before it enters the lake.

34. *Rice Lake* - Winnebago County. 612 acres. Depth five to six feet maximum. Shore land fifty-one acres B of C. Fishing and general recreation.

A beautiful, unsuccessfully drained lake.

Problems: Restoration, cattle pollution, zoning, shore land, bank protection and planting.

Improvements: Consider restoration, check cattle pollution, barnyard wash and erosion, zoning, consider acquisition of public shore land.

35. *Brown' s Lake* - Woodbury County. Area 840 acres. Depth six to ten feet. Fish ing, recreation.

An old oxbow cutoff of the Missouri River. The eastern arm is mostly open water while the western part is shallow with considerable vegetation. The banks are high on the north and east with some timber. Hoovers island and the land to the west of the lake rise a little above the lake level.

Problems: Dredging, cattle pollution, silting, level control, public access, zoning.

Improvements: Dredge 400,000 cubic yards; deepen forty acres to twelve feet: fence out cattle; plant shores; construct permanent spillway at outlet; acquire public access; tone shores.

36. *Silver Lake - Worth* County. Area 310 acres. Depth four to six feet. An attractive small lake with rather high wooded banks. The water is mostly open although there is considerable growth of aquatic vegetation. Excellent picnic areas along the shores. The 1916 report shows the bottom silted.

Problems: Dredging, cattle pollution, silting, level control, zoning, public land.

Improvements: Permanent spillway with sheet piling below if found necessary; acquire shore land; fence out cattle; control bank erosion; cone shores; defer dredging.

37. *Cornelia Lake* Wright County. Area 285 acres. Depth six feet. Fishing, recreation. A pleasing body of water with well defined banks and scattered patches of umber. The 1916 report shows the bottom of the lake silted.

Problems: Dredging, cattle pollution, sewage pollution, silting, public access, coning* level control.

Improvements: Dredge 300,000 cubic yards; deepen thirty acres to twelve feet; fence out cattle; plant banks; acquire public access; zone around shore.

38. *Wall Lake* — Wright County. 935 acres. Depth two to five feet. Shore land B of C twelve acres, recommended to be turned over to Fish and Game Commission as point of access. Proposed waterfowl refuge and public shooting ground.

Improvements: Concrete spillway across opening in old highway embankment; possible land additions for public shooting.

The following meandered state lakes do not fall in the general lake improvement program.

Calhoun County — Towhead Lake — Drained - Pheasant Refuge or sell or lease.
Clay County — Mud Lake — Waterfowl and Wild Life May be extended.
Clay County — Round Lake — Waterfowl and Wild Life (See Trumbull above)
Delaware County — Silver Lake — General recreation and Waterfowl Improvement by county.
Dickinson County - Center Lake — Fish Nursery and Waterfowl.
Dickinson County - Diamond Lake — Fish Nursery and Waterfowl - Needs access.
Dickinson County - Jefferson Slough — Waterfowl and Wild Life.
Dickinson County - Little Spirit — Waterfowl, Fishing. Spawning.
Dickinson County - Pleasant Lake — Waterfowl and Wild Life — Needs road access.
Dickinson County - Welch Lake — Fish Nursery and Waterfowl.
Emmett County —- Birge Lake — Drained - Pheasant Refuge or sell or lease.
Emmett County —-Cheever Lake — Partially drained Waterfowl and Pheasant.
Emmett County —-East Swan Lake — Drained Pheasant Refuge or sell or lease.
Emmett County —-Grass Lake — Drained Pheasant Refuge or sell or lease.
Emmett County —-Iowa Lake — General Recreation, Good Fishing and Waterfowl.
Emmett County —-Ryan Lake — Drained — Now an Upland Game Refuge.
Emmett County —-Twelve Mile — Dry — Pheasant Refuge or sell or lease.
Greene County — Goose Lake - Drained Pheasant Refuge or Restoration by Sportsmen.
Hancock County -- West Twin — Waterfowl and Wild Life.
Hancock County -- Wood Lake Wild Life.
Harrison County - Round Lake — Waterfowl and Wild Life.
Johnson County - Swan Lake — Waterfowl and Wild Life.
Johnson County — Babcock - Iowa River Cutoff.
Kossuth County —- Goose Lake - Waterfowl and Wild Life Needs access.
Kossuth County Swag Lake Waterfowl and Wild Life Needs public access.
Lee County — Green Bay Part of recommended Federal Waterfowl Project.
Louisa County — Odessa Lake — Part of recommended Federal Waterfowl Project.
Muscatine County — Keokuk Lake — Part of recommended Federal Waterfowl Project.
Muscatine County — Muscatine Slough — Part of recommended Federal Waterfowl Project.
Osceola County — Iowa Lake Waterfowl and Wild Life.
Palo Alto County — Silver Lake General Recreation, Waterfowl, Fishing Needs outlet control.
Palo Alto County — Virgin Lake Now a Waterfowl Refuge.

Pocahontas County — Clear Lake — Waterfowl and Wild Life.
Pottawattamie County - Nobles Lake — Waterfowl and Wild Life.
Winnebago County Duck Lake Dry -* Upland Wild Life or Restoration by Sportsmen.
Worth County Brights Lake — Dry - Pheasant Refuge or lease or sell.
Wright County Elm Lake - Waterfowl and Wild Life.
Wright County Twin Sisters Waterfowl and Wild Life.

At some of these lakes shore land acquisition is recommended for preserve or game and fisheries purposes, see Chapter IX. Wherever the lakes, lake shores or lake beds are especially valuable for waterfowl nesting or pheasant wintering or nesting, fences will be needed to keep stock and maurauders out.

This looks like a big program of lake improvement, but two considerations must not be forgotten. The natural lakes of Iowa are worth tens of millions of dollars to the people of the state. And this plan is drawn for a twenty-five year period, and not only for a few years activity. Costs are discussed in Chapter XIV.

The entire plan for the conservation of Iowa' s waters, and especially the surface waters, is of supreme importance to all other phases of conservation and to all human living in this state.

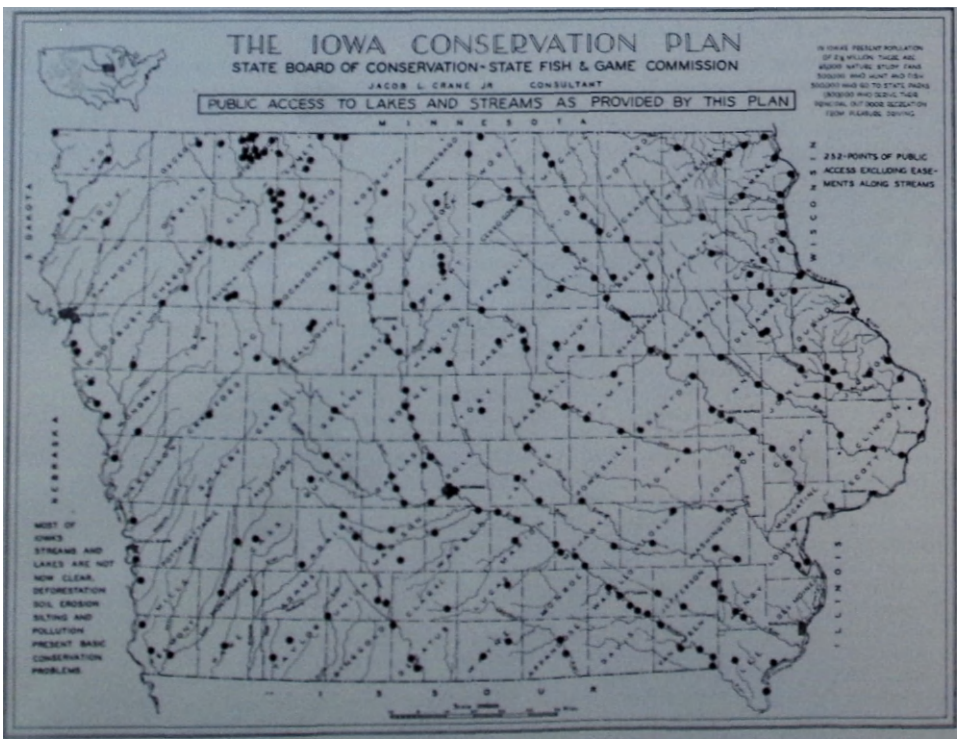


PLATE XXIX THE LAKES AND RIVERS ARE OF LITTLE USB FOR RECREATION WITHOUT PUBLIC ACCESS

CHAPTER VII

WOODLAND CONSERVATION IN IOWA

Iowa never had great forests in the sense that Oregon or Minnesota or Pennslyvania had them. But Iowa is even now a state of fine woodlands. These woodlands constitute *the state's* most urgent item *for conservation.*

THE VALUE OF IOWA'S WOODLANDS

Everyone acknowledges the desirability of conserving woods and forests, although the main reasons given for saving them vary widely. Some emphasize the economic factors, others the scientific, others the climatic, and still others the aesthetic or recreational. After much consideration, the several outstanding values of the Iowa woodlands are ranked as follows, for purposes of this planning work:

1. Their landscape value. Imagine a treeless Iowa and conclude whether life would be worth living here without the woodlands. The whole setting for human life is vitally influenced by the sight of trees and woods in the country: They add to the otherwise open landscape at every point. In the river valleys they give depth and richness and mystery; on the hillsides they add dignity and variation of color and texture; around the lakes they serve as a noble frame; on the prairies they break the monotony and identify and enrich the places of human habitation. They constitute the most beautiful wide-spread element in the Iowa countryside. Under the stress of economic considerations, we must never for a moment forget the extreme value, the *necessity,* of this kind of beauty in our environment.

2. The source of the greatest damage to the farmlands and to streams and lakes, soil erosion, can be checked on steep lands *only* by grass or larger vegeta tion, and nothing but trees will serve in many critical places.

3. In maintaining a biological balance for successful agriculture, the wood lands play an important part. For example, they harbor the birds and animals which keep down the damaging rodents and insects.

4. *Almost all outdoor recreation* in Iowa is dependent to some degree upon woods for shade and beauty.

5. Their direct economic value is enormous firewood, lumber, posts, ties, and the wood-working industries.

6. Without woods and undergrowth, much wild life would disappear alto gether.

7. As natural laboratories for study they are of greatest scientific value and interest.

The effect of Iowa's relatively narrow belts of forest upon the natural regula tion of stream flow and upon ground water levels is debatable. However, they probably are not and probably never were a *major* factor, except in the mainte nance of flow in the fine springs of northeastern Iowa.

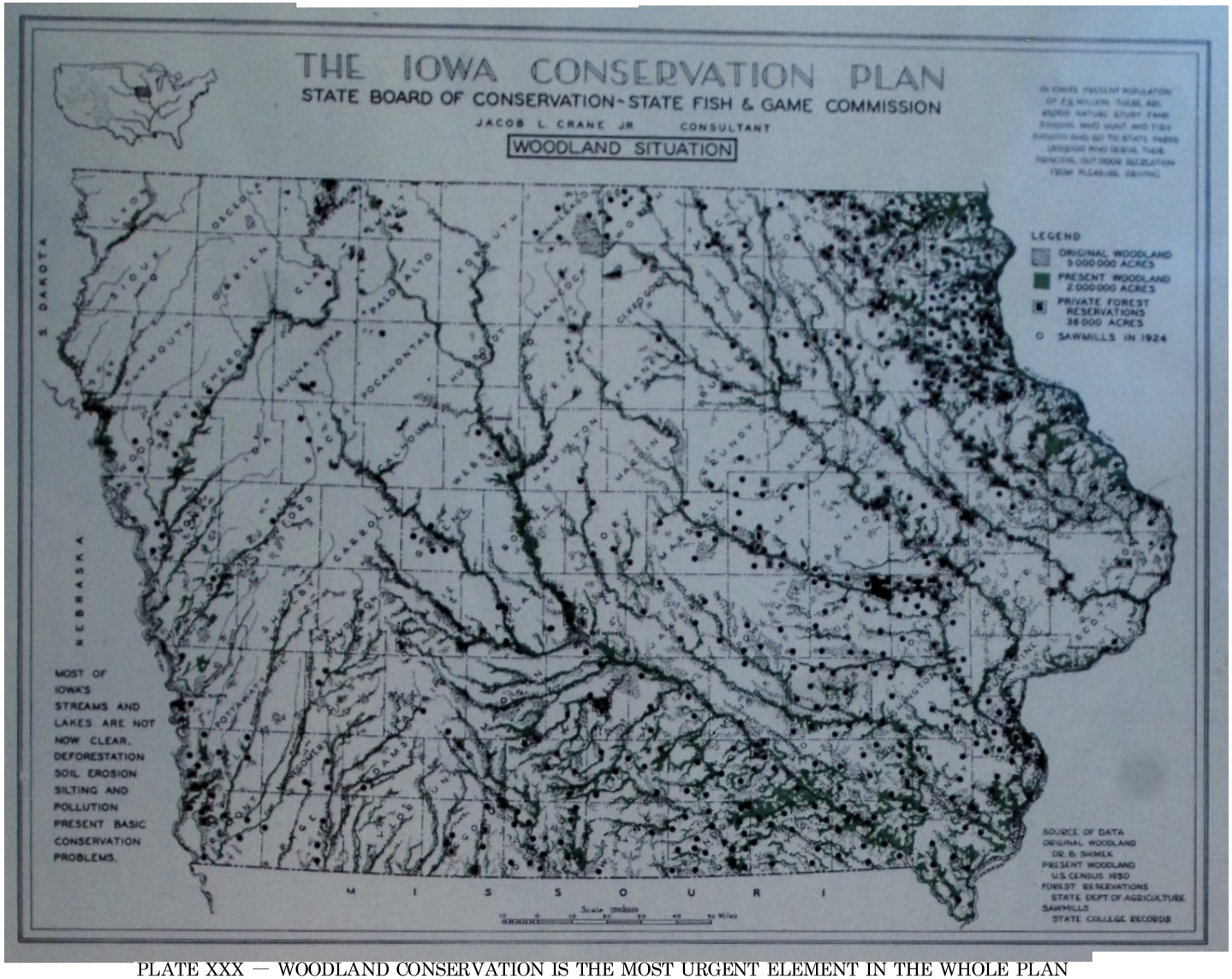


PLATE XXX — WOODLAND CONSERVATION IS THE MOST URGENT ELEMENT IN THE WHOLE PLAN

PLATE XXXI — MOST DEFORESTATION IN IOWA IS UNWISE ECONOMICALLY AND SOCIALLY
Courtesy J- N. Darling

THE SITUATION IN 1700

Two hundred years ago about five million acres, or about one-seventh of the state's area, was wooded. These woodlands were most abundant in the eastern and southeastern sections, and thinnest in the north central and northwestern districts. In several northwestern counties there were no woods whatever except a narrow fringe around the lakes and in the deep valleys of the Big and Little Sioux Rivers.

Along river bottoms, where the growth has always been most abundant, the commonest types are walnut, elm, cottonwood, river birch, hack berry, willow, swamp oak. ash, linden, locust, sycamore, and soft maple. The upland timber consists mainly of oak (many varieties), hickory, hard maple, elm, wild fruit trees, juniper, and butternut. However, the two groups intermingle to some extent, both on the uplands and in the lowlands, and there are many other less common varieties found in all woodland areas.

In the northeastern counties there were scattered stands of native white pine, low-growing yew, and juniper. The remnants are still among the most interesting vegetation in the state.

In all parts of Iowa, the north and east slopes are most frequently wooded, while the south and west slopes are often comparatively treeless. The hot south and southwest winds seem to have checked the growth of trees on southerly and westerly exposures and on the prairies; in turn the lack of trees, plus the hot winds, cause the soil to become dry and hard; and that situation makes it still more difficult for larger vegetation to take hold. The repetition of this circle may account for the sparsity of woods on south and west slopes and on open prairie land.

THE SITUATION IN 1932

Very little indeed of the timber found here by early explorers remains standing. Virtually all that we have now is in "second" and "third" growth. It is generally the same varieties as the original; and it has come back quickly after being cut over. Following the occupation of the state, hundreds of small saw mills went to work and cut off the woods as rapidly as they could, for logs, lumber, posts, firewood, boxes, etc.

There now remain two to two and a half million acres of woodland, including the woodlots, but excluding shelter planting. Of these remaining woods, thousands of acres are cut off in some years and the total has been steadily diminishing. The situation is this: for economic, sentimental and aesthetic reasons the farmer generally wants to preserve his woodlands; but when he is likely to be evicted, or when he must raise cash to pay the taxes or mortgage interest, he is virtually forced to cut and sell the wood, and this is happening to thousands of farm woodlands. Thus Iowa is in a way of losing much of what is left of this essential resource.

Other processes than cutting are also damaging the state's wooded areas. In particular too heavy pasturing is destroying hundreds of thousands of acres of woodland. The same economic forces operate here as with the cutting.

THE PRESERVATION PROBLEM

In some parts of the country, the states and the federal government are buying millions of acres of forest lands. Prom several standpoints it would[1] be most desirable if all of Iowa's two and a half million acres of woodland were trans ferred to public ownership for sound long-time management. But whereas in the "forest states' * the forest lands generally acquired by public agencies coat from fifty cents to five dollars an acre, the timber and the land under the woods in Iowa has a relatively high value, the latter for cultivation or, more often, for pasture. A marketable stand of Iowa upland timber has a value of from ten to thirty dollars an acre, excluding ground value. And the value of cut-over land, even in 1932, ranges from ten to fifty dollars an acre. Hence, for the present, no public agency can purchase any large part of the remaining woodlands, and the major problem is to devise means for the private owner to save them.

The first step in that direction, the Iowa Forest Reservations law. establishes a nominal tax assessment on qualified woodlands, not pastured. A total of 2,329 tracts, 36,055 acres all told, are now preserved in this manner. A much greater total of woodland area would probably have come under the law for preservation except that the local administrators have, by reports, not pushed it in all counties, and have even discouraged its use. It has been argued that to remove some land from taxation increases the burden on the rest; but that is scarcely sound when we consider that only one-tenth of one per cent of the state's area is now prac tically tax free under this law, and, more important, that the economic value of the wooded land, all things considered, is far greater than that of burdensome waste cut-over land. In any event, the tax abatement provision alone has proven itself not a great enough inducement for permanent preservation in many cases, especially when the landholder is hard pressed for cash. It must be considered a temporary expedient only, and other conservation measures must be set in opera tion to supplement it. And up to this moment, we must repeat, the factor working constantly and powerfully against the preservation movement is the insecurity of tenure on the land. The landholder who may soon be forced out by mortgage or tax foreclosure or changing tenancy, is inclined by necessity to take the buyers' cash even though he may wish to save the woods.

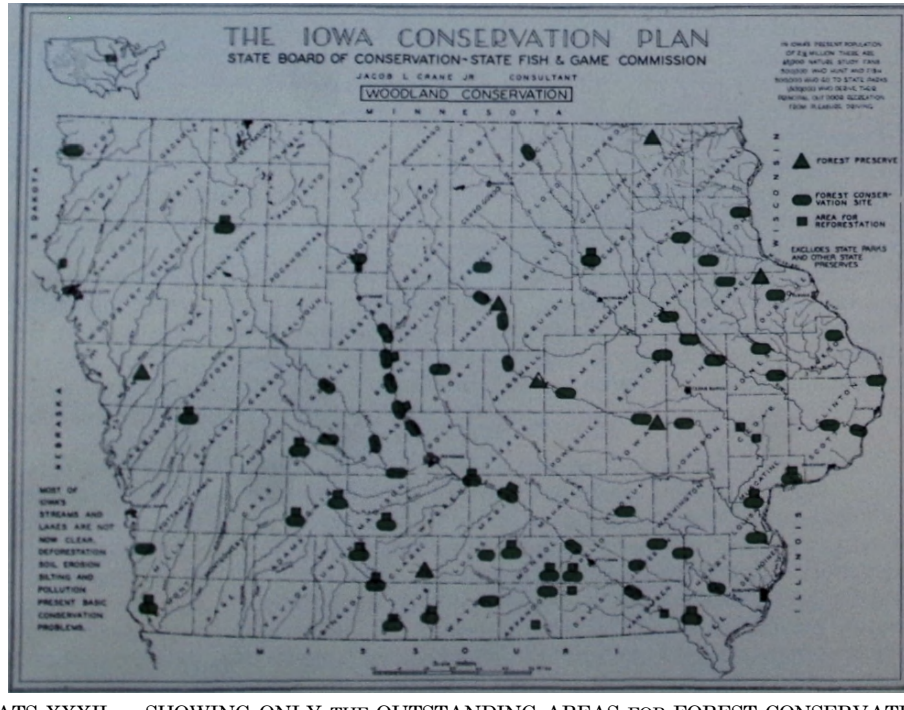
THE REFORESTATION PROBLEM

Land which has been cut-over in Iowa, tends, if let alone and protected against fire and grazing, to reforest itself voluntarily and rapidly. The species coming back are often the same, or in the same group, as those formerly growing on any tract, but with successive cuttings and regrowth, the quality tends to deteriorate. Furthermore, erosion is likely to set in after cutting, and use of the land for pasture aggravates erosion and also in itself prevents regrowth. Never theless, practically all of the present timber in Iowa was produced by natural volunteer replanting. It is quite likely that agriculture in Iowa would profit as a whole if all of the two and a half million acres of cut-over land were reforested, and that much pasture and crop land removed from competition. The changing attitude toward the process of plowing or pasturing *all* land may make this possible

in a relative'y short period. The Conservation Plan, then, should aim at this larger scale reforestation program. And in that program one of the most useful methods is *natural reforestation,* supplemented by scientific management and by rational cutting policies. Hence, technical assistance to the landholder is the important item. It should be remembered that in Iowa, quite in contrast to the situation in many states, a comparatively satisfactory regrowth comes back within a relatively short time.

Among the deforested lands are some hundreds of thousands of acres which, because of poor soil or erosion, are of no value to the farm — in fact such land is a burden. These tracts, mostly found in scattered fairly small pieces, will begin to revert or to be deeded to the counties or the state, and then the state itself will have the opportunity to reforest them.

In some sections of Iowa, natural re-seeding and regrowth is not the best type of reforestation. Where conditions are particularly favorable for the planting and cropping of specific varieties of trees, artificial reforestation by setting out seedlings is the logical method to be used, and this constitutes the second principal reforestation method in the recommended conservation plan. Here, the adminis-



PLATS XXXII — SHOWING ONLY THE OUTSTANDING AREAS FOR FOREST CONSERVATION. THE PLAN CONTEMPLATES STATE-WIDE FOREST CONSERVATION

trative machinery is now available for use by the landholder, or by the state on public lands. The state forestry staff, under the Department of Agriculture and the State College, is in a position to study such land, to specify what and how to plant, and to aid on scientific management. A number of property owners have availed themselves of this service, and many more will do so, as witness the re quests coming in as a result of the stimulation of interest arising out of the con servation survey. Whatever governmental reorganization takes place, the facilities for this work should still be available. Reforested areas may also come under the present forest reservations law for tax abatement, if they qualify in number and variety of trees planted, and if they are not pastured.

WOODLAND CONSERVATION IN THE PLAN

In spite of the extensive field work of the survey and the use of questionnaires, there is not yet sufficient information available to determine with any great degree of precision the various classes of remaining woodlands and their most suitable conservation method; nor is it possible to map out in detail the lands destined for reforestation by the various procedures. However, the survey has discovered the fifty or sixty areas where preservation of existing woodlands or reforestation is most urgently needed. That is. on one hand the *outstanding* big tracts of existing timber and on the other hand the lands most plainly destined for re forestation have been located in all parts of the state, and they are indicated on

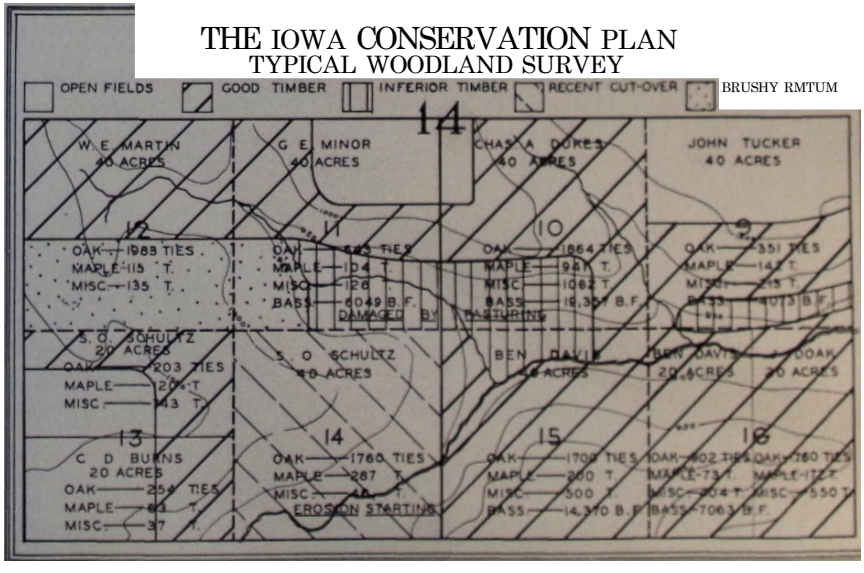


PLATE XXXIII — SUCH SURVEYS ARE URGENT FOR ALL IOWA WOODLANDS — PART OF GENERAL LAND AND COVER SURVEY

Every ***Year the Woodlands Are*** *Being* ***Cut OB***

the accompanying map. In addition, every state preserve and state park, the artificial lakes, the natural lake improvements, and the stream-bank control program involve forest conservation or reforestation or both. These are discussed in other chapters.

Also, detailed surveys have been completed, through the courtesy of the Forestry Department of the State College, at two of the state's most interesting wooded sections. Steps are being taken to bring conservation measures into effect on these two areas, and the general conservation policies here outlined are based on the findings of those surveys.

For the final, detailed application of conservation to the wooded and de forested land of the whole state, under the policies recommended, a state-wide woodland and waste land survey is essential. Only in this way can the measures be used comprehensively and economically for the preservation of the great bulk of the remaining wooded areas and for the reforestation of the great bulk of the cut-over lands. This survey is a logical part of the general "land and cover sur vey" recommended in Chapter XIII. It will be noted how the importance of this land and cover survey mounts up as the various phases of conservation are covered, one by one, in this report.

TO PRESERVE EXISTING WOODLANDS

1. The State Preserves and State Parks will bring into state ownership some 20,000 acres of fine woodland. This is a small part of the total to be preserved, but each of these areas constitutes an *outstanding* example of Iowa forest. They are discussed in Chapter XI.

2. The cities and counties of the state may be expected as time goes on to acquire larger outlying tracts for parks and forest preserves. This matter is discussed in Chapter XIII.

3. National Forests are in process of establishment in many western states and in a few eastern states. Generally they comprise huge areas of *low-cost* timber land or cut-over land, or both. As this policy is extended, it is not too much to hope that eventually a national forest purchase unit could be started in one of Iowa's larger woodland areas. The first step would be for the National Forest Service, under authorization of the Secretary of Agriculture, to survey the Iowa situation for this purpose, and to report upon it.

4. The two million acres of privately owned woodland can be conserved by any one or a combination of the following measures:

a. Any arrangement by which tenure is made more secure, will assist the individual landholder, or a succession of landholders, to exercise woodland conservation on a long-time basis, and without such security the private owners will continue to be unable to do that consistently.

b. Lands which actually revert for delinquent taxes would come thereby into public management, but this is not likely to happen to very much good existing Iowa woodland, unless a general and complete breakdown of the farming industry takes place, under which virtually all agricultural land is taken over by the state or the federal government, either directly or through the insurance companies and other leading agencies, or unless the socialization of the land takes place in some other way. At the moment, these prospects are too obscure to appraise and depend upon. We must deal here mainly with measures which the private owner can put into effect for his own benefit.

c. The *moat promising means for use by the private owner,* is one which derived out of the detailed woodland survey above mentioned. It was found that, with variations in different situations, a policy can be adopted whereby a portion of the trees can be cut in any one year, taking out the majority of the merchantable timber and leaving the balance of the trees for woodlot purposes, to hold the soil, to offer shelter for wild life, and to maintain the beauty of the woods in the landscape. Thereafter, cutting on the same basis could be done every ten to fifteen years, producing a larger annual yield than by one single complete cutting, with the erosion, etc., which is pretty likely to follow. Limited or rotated pasturing might be carried on at the same time. In one typical mature woodland actual computation demonstrated that if the usual cutting specification, which permits all trees ten inches or larger in girth to be cut. were simply changed to a fourteen-inch specification, only about *half* of the trees would be cut out (the larger ones), but *three-fourths* of the merchantable stock would be realized upon in that one cutting, and that the process could be repeated in twelve or fourteen years. Thus, in a period of fifteen years fifty per cent more timber could be sold than by one complete cutting. The woodland could be used section by section for rotated pasturing, and the essential remnant of half the standing trees would be saved to check soil erosion, etc., etc. And in most Iowa situations, the *open* woodland is at least as valuable and as beautiful as the *close*

woods. Such forest management, with many variations, has been used for centuries in Europe. It is plainly destined for extensive use in Iowa. This system requires mainly an administrative and advisory staff to work with the woodland owners. The nucleus of such a staff is already available in the highly qualified members of the Forestry Department at the State College and in the personnel of the Fish and Game Department and the Board of Conservation. Whatever governmental reorganization is effected, cooperative work by these agencies comprises the administrative program. A Division or Department or Committee on Forest Conservation and Erosion Control, as suggested in the chapter on soil conservation, is recommended.

d. In some cases, where it is paramount from the public standpoint to preserve an existing area of woods and where it is impossible for the owner to accomplish this unaided, it may prove desirable for the state to pay the owners a "residual timber fee" of a small amount per acre per year. An arrangement could be made whereby the state leases the woodland for the nominal fee, manages the cutting and grazing, and acquires certain specific rights, such as a share of the net proceeds, the protection of a landscape or a roadside view, control of a particularly serious erosion problem, access for scientific study and experimentation, production of game or other wild life, or access for limited public recreation. So far as can be foreseen now, the state cannot use this method over large acreages, because of the cost involved. Therefore, it must be reserved for very special cases and *only* for such cases. We understand that the Board of Conservation has legal authority for making such leases, terminable by the Board at the end of each biennial period.

e. Finally, all the European countries have legislation or edicts under which the owner of woodlands may not cut them off except by permission of the appropriate governmental authority and under it's supervision. The very great public stake in the preservation or conservation (wise use) of forests is generally recognized there. The public welfare is definitely involved in matters of wood supply, erosion control, landscape beauty, wild life, recreation, climatic influence, run off after rains, etc., etc. In Maine a similar provision is in effect* and has been upheld in the supreme court of the state, for a certain type of situation. The extension of "police power" regulation to the preservation of woods in is line for this country, and it would have some special advantages for Iowa, because of the relative importance of the remaining woodland area here. No long-term conservation plan can fail to record this possibility — legislation to prohibit the cutting of woods, at least where the public interest is especially great, without the sanction and the supervision of the appropriate state authority, which in this case would be the Division of Forest Conservation and Erosion Control.

TO ACCOMPLISH REFORESTATION

1. On public lands. If and when waste cut-over lands revert to the counties or the state, or when parts of farms are deeded to the state, these lands may be reforested under supervision of the Division of Forest Conservation and Erosion

'lafanatioa by Dean Samuel Dana. School of Foreatry and Conservation, University of Michigan.

Control. Either natural reforestation or plantation methods may be used, de pending upon the situation. Such tracts may be called State Reforestation Units and after they have grown to forest they may be classed as Forest Preserves. It is possible that some tens of thousands or even hundreds of thousands of acres may eventually come in for reforestation in this way. That would be a small total in some states, but it is important in Iowa. The state may eventually pay out the cost by timber cropping on such reforested lands. Conditions vary so widely that it is impossible to offer specifications for types of trees, spacing, etc., which would be generally applicable. Details will have to be determined for each area.

2. On private lands. A part, and perhaps a major part of the waste cut over land in Iowa will be retained for the time being in private ownership for reforestation. The reforestation, either natural or by planting, may be done by the owner, but he should have technical assistance from the Division of Forest Conservation and Erosion Control, of which the staff at the State College forms the nucleus. In special cases, particularly along stream banks and lake shores, the state Division may carry out the planting itself, the owner getting such rights as wood-lot privileges, and the state acquiring easements or title for supervision of grazing, trails, picnic grounds, etc.

The forest reservations law is applicable to nearly all of the conservation program for woodlands and it is susceptible of much wider use. Other legislative measures are suggested in Chapter XIV.

From all of the above discussion it will be realized that the success of wood land conservation is dependent most of all on the attitude of the owner and par ticularly of the public as a whole. Hence, the very backbone of the program must be educational. The instruction at the State College and at the University, the agricultural extension work and the work of the county farm agents, much edu cational effort by garden clubs, ornithologists, the Academy of Science, women's clubs, and sportsmen' s organizations — all of this has been effective, and it is extremely important that it be continued and expanded. Further, the Division of Forest Conservation and Erosion Control, will eventually have to have dis trict representatives throughout the state (as in Europe) both for technical and for educational work.

The whole woodland conservation program is supremely important to the people of Iowa. The beauty of the landscape, the control of erosion and all of its resulting damage, the maintenance of biological balance for agriculture and for wild life, the provision of outdoor recreation places, the economic uses of wood, and the protection of native animals and plants for observation and study - each of these aspects of human living is tied up hard and fast with the preservation of woods and the reforestation of cut-over lands.

Reforestation
Eight Years' Growth from Seedlings. Some of These Trees Are Twenty-Eve Feet High

CHAPTER VIII

THE CONSERVATION OF WILD LIFE

This chapter deals with the principles of wild life conservation and specifically with birds and creatures not classed as shootable game. Changes in abundance may sometimes result in the shift of a certain species from the shootable to the non-shootable group or vice versa.

HISTORY

The wild bird and animal life of Iowa has *changed* radically in the last hundred years. Most of the changes followed and were caused by changes in the face of the land. Some were gains, others were losses; some were inevitable, others unnecessary. Conservation is concerned mainly with recouping the un necessary losses, which have been large, and with holding the gains.

Settlement drove out the big-game species: the buffalo, the bear, the elk. antelope and deer, and also the wild turkey. Not a single passenger pigeon re mains of the huge flocks which once darkened the sky in their flight. These losses were the inevitable consequence of civilization, except possibly in the case of the turkey, which could have been retained and may now be restored on the poorer soils suitable for forests. A few half-tame deer remain in a state once well suited to them. Some of the most interesting animals, like beaver, are almost impossible to find now except in private sanctuaries.

Settlement first increased but later mercilessly reduced the former abundance of prairie chicken, sharptail grouse, and ruffed grouse; but the present near-extermination of these splendid native birds was unnecessary. Local samples, not for shooting, but for observation and study, can easily be restored and per petuated by providing sites where the essential environmental elements can be reproduced.

The occupation of the state has inevitably reduced the great hosts of migra tory waterfowl, both game and non-game, which once bred in or passed through Iowa. The continued decrease is the result of unwise drainage and of overshooting.

Settlement at first increased and then reduced the numbers of bobwhite quail, and the shrinkage of coverts responsible for that reduction goes steadily on. with a corresponding shrinkage in quail, despite its closed season. This trend may be reversed by letting landholders who *restore* quail harvest the surplus as game.

The pheasant and the Hungarian partridge have been substituted for the native game excluded by environmental deterioration and overshooting, but even these hardy exotics cannot exist in shootable numbers without deliberate maintenance of cover and food by landholders.

Some songbirds have suffered from the shrinkage in prairie sod and forest cover, but many others have profited greatly by the more uniform dispersion of cover and food which followed the clearing of forests and the cultivation of prairie lands.

All these gains and losses have been unpremeditated and accidental. Most were the result, not of human occupancy as such, but of the manner in which we have used the tools wherewith that occupancy was accomplished. These tools are plow, axe, fire, fence, gun, and live stock.

MANAGEMENT

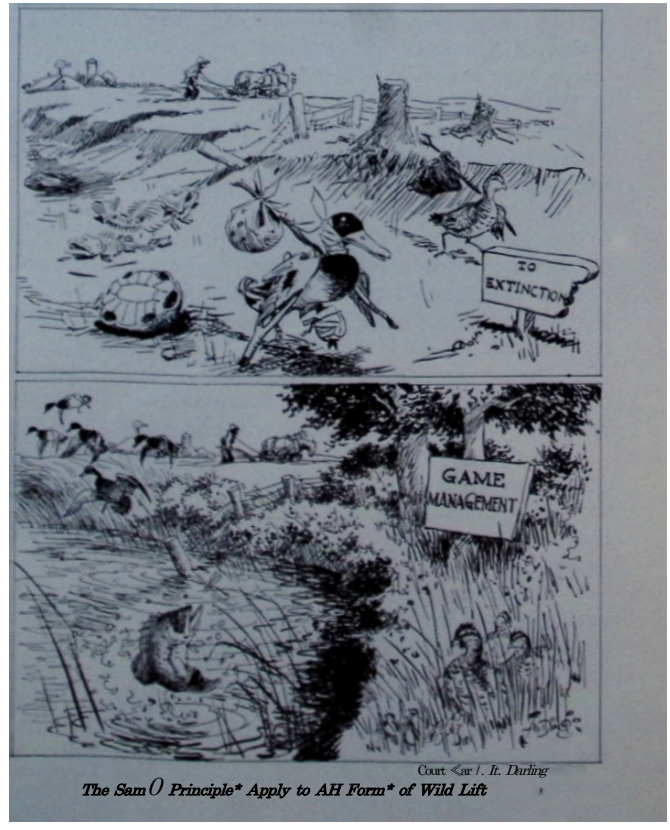
These tools have sometimes, again by accident, been used to benefit as well as to destroy wild life. There is conclusive evidence that the tremendous increase in quail and prairie chickens which accompanied the early settlement period was due to a favorable balance of food and cover accidentally brought about by axe, plow, and fire. If this be true, cannot these same tools be used in the deliberate accomplishment of conservation?

They can. Such use is called wild life management. Wild life administration fosters and regulates the creative use of these tools. Wild life research discovers which tool to use, why, how, when, and where.

INCENTIVE

Wild-life management is the deliberate manipulation of the habitat to control populations. It is applicable to all living things which we need or want. It is the main available instrument for restoring both game and non game wild life. It has long been used in a fragmentary manner. Bird-houses, house-cat control, and winter-feeding are fragmentary management practices. What we lack and must now develop is an adequate incentive for land holders to practice management in a comprehensive manner.

Bird lovers possess the best of all incentives, the love of birds. Sports men have a good incentive for fostering wild life.



Court ⩽ar /. It. Darling

The Sam O Principle Apply to AH Form* of Wild Lift*

Raccoons

the love of sport. How* ever, only a fraction of Iowa is owned by either. Wild-life management cannot be practiced suc cessfully by non-owners.

The crux of the wild life conservation problem then, is to bring to bear on the average landholder the desire of others to see or to hunt wild things. If he does not share this desire, he may neverthe less be made to act by compensating him for his services as custodian of the state's wild birds and animals.

There are many forms of compensation. One of the most direct and simple is for sportsmen to compensate farmers for the privilege of sharing the game crop. Another is for the state to extend special trespass protection, or special harvesting privilege, to those who produce a crop.

There are no known ways to compensate private landholders for productive custodianship of non-game wild life, but since its requirements are similar, a *large benefit to non-game species will accrue automatically from the manage ment of land for game.* Further, most Iowa countrymen wish to conserve the harmless and beneficial forms of song birds and furred animals because they enjoy and appreciate them for their own sake.

LAND POLICY

All non-migrating birds and animals are alike in that they do not tolerate crowding. For example, one bird per acre is the maximum attainable population of upland game birds. Hence, a large part of the state must produce these birds if there are to be enough to supply sport without overshooting the stock. More over these birds inhabit expensive farmland, which the state does not now own. Therefore upland game management for the present must be built up around the private farmer, on a compensation basis.

Waterfowl are less intolerant of crowding; they inhabit public waters al ready owned by the state, or marshes which can be acquired. Therefore, water-fowl management can be mainly a public activity on public lands, on a basis of free public use.

NON-GAME WILD LIFE

The objective of the game program is to provide for the average citizen an opportunity to hunt. For this opportunity to have social value, it must have a widespread geographic distribution.

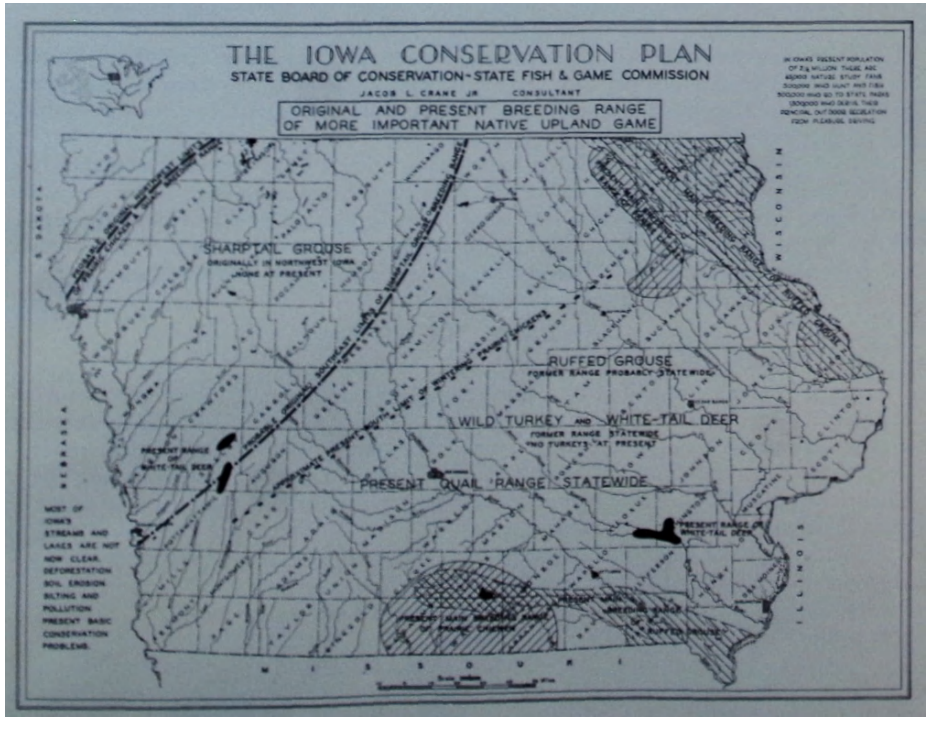
The objective of the conservation program for *non-game* wild life is to retain for the average citizen the opportunity to see, study, and enjoy the magnifi cent variety of wild things indigenous to the state. This implies not only that these forms be kept in existence, *but that the greatest possible variety and abundance of them live in each community.*

The non-game forms of wild life divide themselves into two classes:

1. Those with habitat requirements which can be met only on public reser vations created for the purpose.

2. Those with habitat requirements which can be met on ordinary private lands, supplemented by the publicly-owned areas.

The first class, which we may call, for short, "sanctuary species" subdivides into those which can be accommodated in existing reservations, such as state parks, and those for which special sanctuaries must be established. The following outline classifies the major species and lists the Conservation Plan projects designed to perpetuate them. The accompanying map shows the geographic distribution of the sites recommended to shelter particular forms on groups of non-game wild life.



PLATS XXXIV THESE SPECIES REQUIRE SPECIAL SANCTUARIES TO PERPETUATE THEM

SANCTUARY SPECIES AND SITE PROJECTS

Species	*Existing State Area*	*Recommended State Area*
Wild Turkey	Keosauqua Park	Sioux Hills Park
Prairie Chicken		Prairie Preserve
		Howard Sanctuary
		Wayne Sanctuary
Sharptail Grouse		Sioux Hills Park
		"Missouri Bluffs" Sanctuary
Ruffed Grouse	Many present parks	Several Planned Parks
Deer	Keosauqua Park	"Missouri Slaps" *, two sites
Beaver		Beaver Sanctuary (Monona Co.)

The upland game map (next chapter) shows the regions in which still are found some forty isolated colonies of ruffed grouse, and sixty of prairie chickens persisting on private farm lands. The Fish and Game Commission is each of these remnants, appointing an unpaid custodian for each, and attempting to induce local farmers to leave such food and cover as each may be found to require.

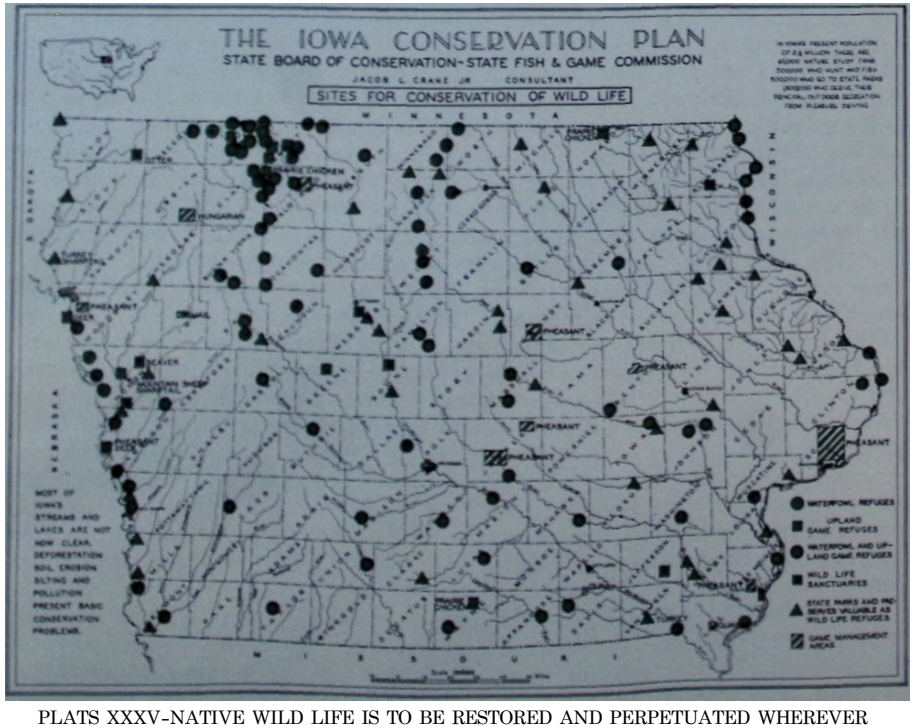
The second group of non-game wild birds and animals, those which find safety and food in almost any type of supervised public land and also on ordinary private lands, are probably most important of all. They are the forms which add delight to everyday living for all the people of Iowa, both in the towns and in the country. To preserve and increase and protect them we must maintain and restore the environment in which they can thrive. Along with their other objectives, virtually every element of the recommended conservation plan is aimed to accomplish this purpose. Every erosion control and woodland con servation project will save and reproduce haunts for birds and wild creatures The lake restorations and lake improvements, and the artificial lakes and state lands around them, will supply suitable habitat for great varieties of wild life *protected.* Every upland game refuge and every waterfowl project will auto matically constitute a wild life sanctuary. All the state preserves and state parks will harbor countless numbers of birds and animals where they may be observed and studied and heard. On private lands, the erosion control planting and the reforestation, and the vegetation and food to be provided on thousands of farms all over Iowa, as a part of the upland game program — all of this will work vast benefit to non-game species. The highway planting project and the scenic high way program will bring food and shelter for wild things along the roads. This is a generalized statement of the manner in which the *entire conservation plan* will work for the preservation and increase of wild life in its infinite variety of beautiful and interesting forms.

Over and above these measures, however, there remains a large undeveloped opportunity to interest landholders in the deliberate creation of special environ ments for *particular species* of non-game wild life. The exploration of this opportunity is one of the functions of the wild life research department which

*A term deriving from the "•lap" of willow branches when a person walks through these bottom lands.

has been set up at the State College. For each of the rare songbirds, for instance, there is a set of environmental specifications, even though they have not been worked out. To work them out is the function of research. Once they are avail able they may be used by many landowners for building up the varieties of birds to be found on their land. In short, the farmer or the owner of a country estate will some day build range to attract the Kentucky Warbler, or the Alder Fly catcher, or the Bells' Vireo, or the Blue-Gray Gnat-catcher, with the same ex pectation of success as he now enjoys in erecting a martin-house, or as the sports man now enjoys in building range for game birds.

In the past Iowa was very richly endowed with the beauty and interest of wild creatures. The period of damage to this endowment is probably over. In the future the state will again rejoice in the abundance and variety of its wild bird and animal life.



PLATS XXXV-NATIVE WILD LIFE IS TO BE RESTORED AND PERPETUATED WHEREVER POSSIBLE

CHAPTER IX

THE CONSERVATION OF GAME

In connection with the conservation plan survey, a game survey was made by Aldo Leopold, an outstanding consultant on game management. Mr. Leopold's services were made available largely through the courtesy of the Small Arms and Ammunition Manufacturer's Institute. This chapter and the preceding one, along with certain other material constitute the principal findings of the game survey report, which has been published in full in Outdoor America, and reprints of which may be secured from the Iowa Fish and Game Commission.

Dr. H. M. Wight of the University of Michigan School of Forestry and Conservation, has reviewed all the recommendations of this report and particularly the chapters on wild life and game. The U. S. Biological Survey. Dr. W. L. McAtee, has also reviewed these two chapters. Wallace Grange, then of the U. S. Biological Survey, and John Ball of the American Game Association field staff, assisted materially on the field work.

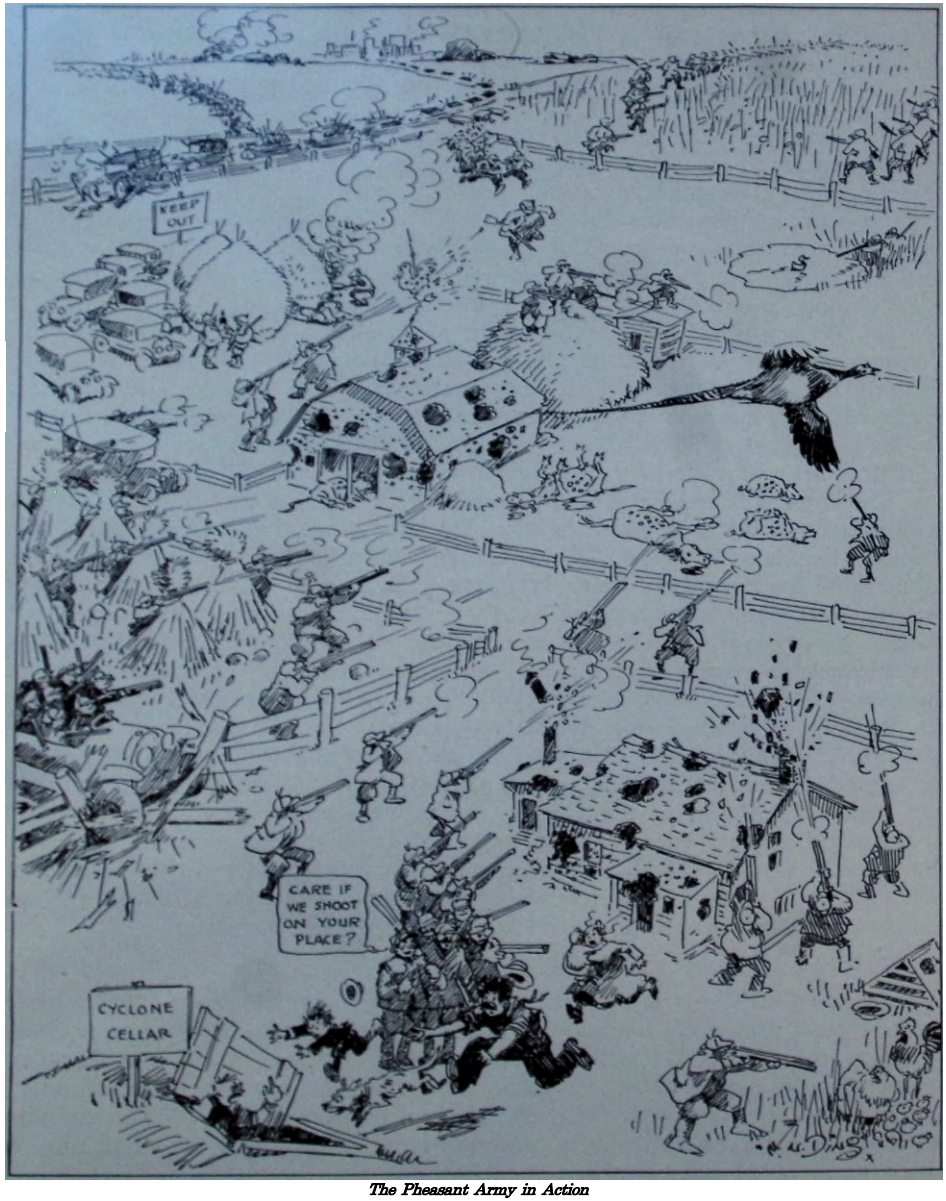
The impulse to hunt is strong in nearly every boy and man. When decently conducted, hunting is an excellent sport for many thousands in Iowa and it aids toward a livelihood for a few. The animal population of Iowa has suffered greater injury from the pursuits of peace, cultivating the land and cutting the woods and undergrowth, than from hunting itself. Every hunter learns something about natural history and the habits of wild things; virtually every hunter becomes a conservationist. Some hunting requires a degree of hardihood and patience not appreciated by the person who stays at home. All told, hunting, when carried on properly, is a wholesome, interesting sport fully justifying cooperative action of the sportsmen, through the State Fish and Game Commission, to bring about better and more decent shooting, which means more abundant wild life in all forms.

However, hunting is not claimed to be the one most important human activity in the world nor is it even the most important outdoor recreation, and its values are not over-emphasized. It can be given an appropriate place in the whole conservation plan, it entails only reasonably small expense, as shown in what follows. *and it dove-tails* beautifully with the other elements of the plan.

HISTORICAL

At one time Iowa was literally full of game — buffalo, bear. deer, turkey, quail, grouse, prairie chicken, wild pigeon, ducks and geese, rabbits and squirrels and fox. Even after the buffalo, bear and deer had been driven out. Iowa remained a small game hunter's paradise for a while But one by one the man with the gun and the man with the plow and axe have destroyed *all the original* good hunting except for rabbits, squirrels and ducks! And the abundance of these few forms of game has been materially reduced.

The original stock of deer was mostly gone by 1865, although a few remnants hung on even until 1915. The four present half-tame herds consist of "escapes" from private herds.



The Pheasant Army in Action

PLATS XXXVI — THE LANDHOLDER MUST BE PROTECTED AND COMPENSATED — Courtesy J. N. Darling

At the end of the civil war most of the wild turkeys had disappeared although a very few survived as late as 1910 in south Iowa. Plants of wild turkeys have failed.

The abundance of prairie chickens seems to have increased with the early days of settlement, up to a peak about 1870. Sufficient cover remained and grain farming offered a better supply of food. In 1876 the sale of prairie chickens was prohibited, reflecting the realization of the diminishing chicken population. Pro gressive limitations on the kill continued until in 1917 the season was closed alto gether. But even so, only twelve counties now possess fifty or more resident birds*, and the total for the state probably does not exceed 2.000, as contrasted with the millions once living on Iowa's prairies. There is not enough virgin prairie left to restore the prairie chicken in sufficient numbers for shooting. But this beautiful and interesting bird can be preserved in small numbers on sanctuaries suitable to his needs, as outlined in the preceding chapter.

The sharptail grouse lingered in their natural habitat, northwest Iowa, until about 1892, then disappeared altogether except for winter migrations from the

'Migrants still come, in from outside during years of high abundance, but for a short period only

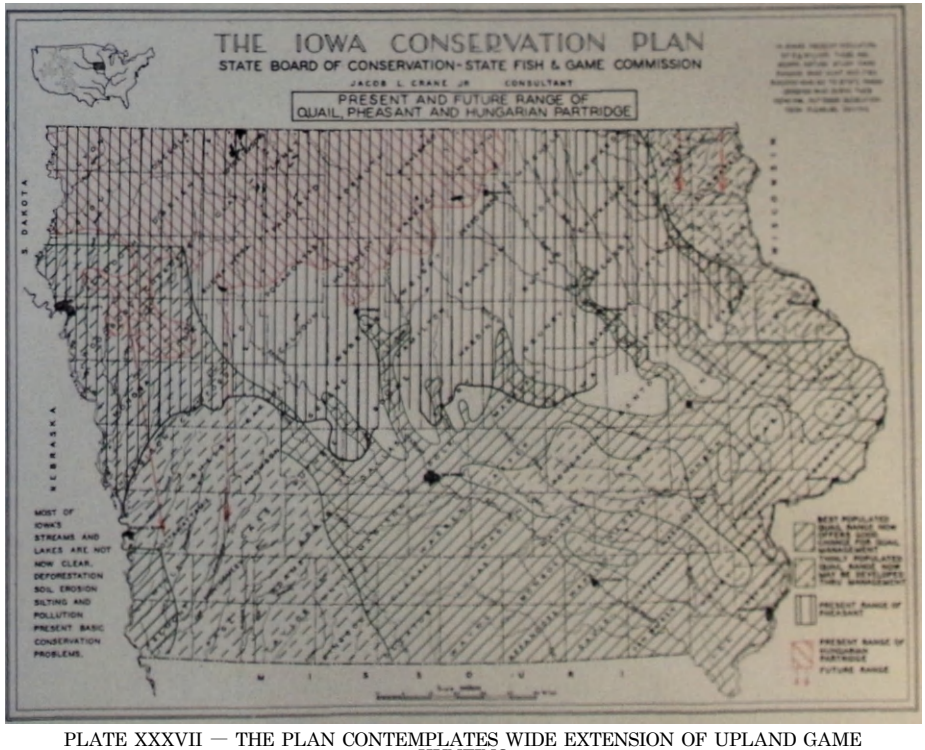


PLATE XXXVII — THE PLAN CONTEMPLATES WIDE EXTENSION OF UPLAND GAME HUNTINO

PLATE XXXVIII — THESE PROJECTS ARE FUNDAMENTAL TO EXTEND HUNTING AND TO PROMOTE WILD LIFE

north, which still bring them into their old stamping ground in relatively small numbers. They will not again be sufficiently plentiful for shooting, but sane* tuaries are recommended to preserve a sufficient number for observation and study.

The ruffed grouse ranged in some abundance over all except northwest Iowa. By 1907 it had become rare, and it was closed to hunting in 1923. This bird, of great scientific interest, whose "drumming in the spring woods" is not to be for gotten, can be most easily preserved in the State Parks and State Preserves. Some difficulties, such as damage by foxes, require further study and control to insure successful preservation.

CONSERVATION POLICY

For the reasons pointed out in Chapter VIII, *upland* lame hunting can be indefinitely perpetuated only by encouraging the farmer to treat game as a crop, and by compensation to him for such odds and ends of time and land as he de votes to its production.

Migratory waterfowl, both game and non-game, can be indefinitely extended by the public acquisition and restoration of lakes and marshes, by establishing an adequate refuge system, and by the regulation of hunting on shooting grounds.

Both of these policies call for substantial changes in the present hunting system. If it is not changed hunting as a public recreation will go out of existence through the progressive posting of lands and the restriction of open seasons, if not through the progressive decline in game supply.

THE UPLAND GAME PLAN

Short seasons are unnecessary on land where *the owner* calls a halt on the shooting as soon as the surplus game has been taken, and where food and cover are ample to winter the remaining seed stock, and to enable it to reproduce. The basic requirements of any self-sustaining shooting system require that someone

1. Call a halt when the surplus has been taken.
2. Provide food, cover, and protection.

The farmer can and probably will perform these functions for resident or upland game when given a proprietary interest in its welfare. He will not per form them when anybody who comes along can invade his place and make away with the crop. Universal posting, and an adequate "farmer's permission" trespass law, are therefore necessary.

There is a difficult problem, however, in bridging the transition period during which some farmers will have learned these functions and others not. Immediate liberalization of seasons would be dangerous. The most feasible plan is to liberalize seasons *selectively,* granting long seasons only to organized groups of farmers who are practicing management, and then only subject to recall. A powerful leverage can thus be set up for *organized groups to earn* shooting privileges by actual conservation work on specific areas. The disposal of shooting privileges thus earned is left to the landholder under state supervision. This gives to sports men who own no land an incentive to cooperate, on terms mutually satisfactory, with farmers who do own the land.

The tightening of the trespass law, and a law authorizing the fish and game authorities to try out rational game management through organized farm groups, are the two basic legislative measures called for by the recommended upland game plan.

The following sections outline the history and status of the principal upland game species in relation to this plan.

QUAIL

The career of the quail, the wonderful whistling bob*white, has caused much controversy in Iowa. If all the energy spent in *conversation* and recrimination had been devoted to sound study of the situation and to rational action, this bird might now be far more plentiful than he is. He lived originally, seldom in great abundance, in the border-zone between prairie and woods, where he had some good cover but only a variable food supply. The first settlements did not destroy all the cover and in fact added the osage hedge to it, and they also added grain and weeds to the food supply; and a great expansion of the quail population fol lowed, both in abundance and in wider distribution. A succession of adverse events then took place: *all* the clear land was plowed or grazed*, osage hedge gave way to barb-wire fence, and the environment was again put entirely out of balance, this time with plenty of food but little cover. Heavy local hunting afoot, killing winters, then good roads for the flood of automobile hunters with improved firearms, and the number of quail was reduced to a mere remnant, comparatively. Since 1916 there has been no legal quail shooting in Iowa. But "pot-shooting" is still an adverse factor in some localities.

The first question now confronting Iowa is that of determining whether the policy of total closure is successfully conserving quail. A census of 316 farms re vealed an "average" stand of two to four acres per bird in south Iowa on such farms as contained any quail at all, but *forty to ninety-five per cent of the farms were blank.* A count of south Iowa quail coverts showed that for every habitable covert still remaining another has become non-inhabitable (usually through grazing) during the last decade. The condition in north Iowa is worse. Total closure, therefore, is alone *not* a successful way to main tain quail in normal abundance as a part of the environment of the average Iowa community.

f/iMMnfa *Require Winter Feeding Grounds*

Resumption of the former statewide open season would doubtless stimulate some fanners

*As recently as 1917 and 1918, during the War. farmers were *urged* to plow right up to the fence comers.

to leave food and cover for quail, but there is no assurance that many would do this, and the intolerab'e trespass problem which was partly responsible for the original closure would remain wholly unsolved. Neither would it be any body's special business to call a halt on each farm when a reasonable *surplus of* birds had been taken. Blanket reopening, therefore, is not a promising way to conserve Iowa quail.

The logical policy is to keep quail closed in the state as a whole, but to permit shooting on such organized groups of farms as can convince the fish and game authorities that they are restoring cover and food and effectively *limiting the kill* to a maximum specified in the permit.

Such a system of selective opening might eventually spread far enough to permanently solve the quail problem.

The arrangement under which the town hunters may participate in the shooting is left to the farmers, again under state supervision. In quail manage ment, small land units are feasible, hence there is large opportunity for local sportsmen to establish semi-personal (as distinguished from commercial) relation ship with small, groups of farmers, under which they may share in the shooting by sharing in the small cost of producing it.

To administer such a system requires a skilled staff, such as that now building up in the Fish and Game Commission and at the State College.

To test the feasibility and cost of restoring quail by farmer-management three test areas have been set up in Davis, Polk and Ida counties.

THE PHEASANT

The story of the Chinese pheasant in Iowa, since his first importation, is similar in some fundamental ways to the career of the native quail. Pheasants were first "planted" near Cedar Falls in 1900 and all told probably 60,000 birds have been set out in various parts of the state. They are now established, with varying degrees of abundance, throughout the northern half of the state (see map). Their success in the southern half remains problematical thus far. No one yet knows with certainty the reasons why they have not thrived in that section, al though several hypotheses have been advanced and are under examination. A controlled mass-planting experiment* in a southern county has been recommended, and consistent research into the pheasant's environmental requirements is under way, in the hope of solving this mystery. It is a fortunate coincidence that the pheasant thrives in those northern prairies least adapted to quail. This means that some upland game bird is available for management in every part of Iowa. The "natural" allocation of shootable species is shown on an accompanying map.

In the northern half of Iowa, and particularly in the northwestern quarter of the state, (despite enmity on the part of some farmers, frequent nest-robbing by boys, and some illegal shooting), pheasants have done well enough in some years to produce a shooting surplus. Since 1925, twenty-seven counties have had brief open seasons, (two to five days) at one time or another. These very short

*Studied and recommended by Wallace Grange, then of the U. S. Biological Survey.

seasons on relatively small areas result in an unsocial congestion of hunters. The "pheasant army" plunging across the com fields of northern Iowa creates a picture full of irony. This situation lowers the recreational value of the sport, leaves a heavy crippling loss, and irritates fanners. To relieve themselves of the trespass nuisance more and more landowners are posting their lands, and some have de liberately destroyed nests with breeding birds. The objective of management is to relieve this congestion by *enlarging the open area and lengthening the* season. This can be safely done only where farmers are organized to provide cover and food and to call a halt when the surplus pheasants have been taken.

A census of 340 farms showed the average pheasant population in north Iowa to be the same as the average quail population of inhabited farms in south Iowa, namely two to four acres per bird, but with this significant difference: nearly all of the farms in the pheasant country contain some pheasants, whereas forty to ninety-five per cent of the farms in the quail country are devoid of quail. The pheasants are naturally much more uniformly distributed than quail.

The game survey demonstrates that the shootable surplus may be extended both in abundance and in area. The abundance may be increased from four-fold to ten-fold, depending upon the present density and upon the local situation, and the good pheasant area may be doubled. All told, game management may be expected to produce six times as much good pheasant shooting as is now available. It is evident that more pheasant *planting* is not the way to larger abundance. Hence the state pheasant farm operations have been discontinued. The neces sary planting stock for southern Iowa can be purchased.

Nesting cover, winter cover, and winter food are the elements most needed to produce a larger and better distributed crop of pheasants. Of these, nesting cover for the preceding year' s added stock is probably the most important. For lack of such cover many pheasants nest in hayfields. where the nest is destroyed by the mowing. The "flushing bar" device is being urged upon farmers to obviate this difficulty, but it will not of itself solve the problem. Protected nesting grounds are essential. Likewise, protected wintering places are required for the program.

To meet the basic needs for pheasant increase the following recommendations have been made and are now in process of execution. First, the landholders are shown which unused or valueless pieces of their farms may be devoted to pheasant nesting and wintering and to summer food supply; and advice is given on how to manage such areas and what to plant or to maintain for food and cover. This program is susceptible of indefinite extension over the whole pheasant territory, on private land by private management. Second, the recommended plan includes over a hundred sites now owned or proposed for state ownership which will have definite value for pheasant nesting or wintering or both, as well as for summer shelter and food. Of these, some fifty-five areas are in connection with waterfowl projects, a dozen are Board of Conservation drained lake sites eligible as pheasant and wild life refuges, and at least thirty are included within tracts designated primarily as state preserves or state parks. Two large deer and pheasant tracts are suggested in the Missouri "slaps" (see map).

The problem of how to induce the landholder to manage pheasant production is complicated, by the fact that most of the hunters come from distant counties, and, being personally unknown to the farmer, there is less chance for a personal as distinguished from a commercial farmer-sportsmen relationship. Many varied forms of relationship, ranging from straight daily fees to unpaid "ticket systems," are being tried out in a series of ten test areas which have been organised in several northern counties. It is the intent to liberalise the open seasons on these test areas as rapidly as they show their ability to increase the birds and regulate the hunting. The hope is that management by farmer-groups will spread and ulti mately become universal throughout the pheasant belt.

By these direct and relatively inexpensive means, it is expected that at least half of Iowa will in a few years offer ample pheasant hunting through a season of reasonable length, for all who are interested in this type of shooting, — a vast increase in this recreational facility.

THE HUNGARIAN PARTRIDGE

This bird was first imported and planted at Waterloo in 1902, but the colony did not survive. The first successful plant was made in Palo Alto County in 1905. Between that time and the World War. 23,782 imported Hungarian partridges were planted by the state. All parts of Iowa were tried except the extreme south west, but the birds become established only in the northwest quarter, which seems to constitute the natural Hungarian range.

No legal shooting has been allowed so far. The assumption has been that continued protection would result in a shootable stand, but it is doubtful if this assumption is valid. A slow expansion of its inhabited range has taken place and is still taking place, but the *density* of the stand is not increasing.

A census of fifty-seven sample farms in northwestern Iowa showed an "aver age" stand of eight to twelve acres per bird, which is much thinner than that pre vailing for quail and pheasants. The density is greatest in the northwest comer, and thins out rapidly eastward. Successful establishments are confined so far to Missouri loess soils, and the soils of the Wisconsin glaciation.

To make the Hungarian shootable game it is necessary to enlarge the range and to increase the density.

In southwest Iowa there is a large area of loess soil apparently similar to that in the northwest now carrying the heaviest stands. This should be planted.

To obtain stock for planting, it will be cheaper and better to manage and trap wild birds than to import European stock. Hence a test area has been set up in O' Brien County to build up the stock and to trap the surplus for planting. The state will pay the farmers for the stock thus produced. Incidentally this operation will test the feasibility of building up stands for shooting.

Lack of nesting cover is the most probable reason for the low densities which now prevail. The Hungarian nests early. In the absence of grass cover from the preceding years growth, the nests are either exposed to prowlers or placed in hay-fields where they succumb to the mower.

The Hungarian is a more valuable bird than the pheasant, and thrives in that part of the state least adapted to restoration of native game birds. The fostering of Hungarian management among farmers is therefore an important part of the game conservation program. As with quail, there is little or no chance for perpetuating unregulated public shooting. But with the extension of the program outlined, the Hungarian Partridge seems destined to establish itself as a most valuable game bird in its best territory.

THE MIGRATORY WATERFOWL PLAN

The conservation of ducks and geese is probably the most significant element of the whole game program.

As already pointed out, the problem of balancing production and consumption for migratory birds is basically different from that for resident upland game. There is no inherent reason for the landholder to call a halt when enough has been killed. Only the state and federal governments have any inherent incentive to conserve the migrators. Hence the whole waterfowl program must be built up around the idea of public ownership and control, rather than of private custodianship and control. Such public ownership and control is limited by the availability of public funds.

It is futile for Iowa to look to the federal government for a total solution of this problem. The federal agencies will do well to handle the interstate aspects of it. A source of state funds is needed for Iowa's internal problem. Since the program deals with the restoration and improvement of waters and marshlands, it overlaps the field of fish management. Hence an increase in hunting and fishing licenses is proposed as the means of financing.

Out of the maelstrom of opinions and counter-opinions certain conclusions stand out as the safe guide for Iowa in conserving waterfowl.

1. Nesting and resting and feeding grounds must be extended and re established. Marshes must be saved or restored and adjacent meadows must be protected. Nesting cover must be provided where necessary, water levels stabilised, etc.

2. All that Iowa can do in this direction will repay the conservationists and hunters of the state.

3. Ducks will probably continue to be produced in the northwest, mainly outside Iowa, sufficient to supply all the refuges and shooting grounds we can secure.

4. The program must gradually develop an organized and *balanced* system of refuges and of regulated public shooting grounds.

5. The program should also include correction of bad shooting practices in line with national policies, both on public and on private shooting grounds.

6. And it must include a continuous research program through the wild life research staff at the State College, and in cooperation with other states and the Canadian provinces.

The big development job for the Conservation Plan, then, is the acquisition, restoration, improvement, and management of waterfowl refuges and shooting grounds.

Out of all branches of the conservation survey, a total of some ninety projects primarily for waterfowl purposes have emerged for examination. Leopold reported tentatively on fifty-two. These and the others have been studied by biologists, game experts, and engineers. Sixty to seventy projects seem to prove up as feasible and justifiable; the others are not practicable. The feasible waterfowl projects comprise a total of about 35,000 acres of water and marsh area of which about 11,000 acres would be restored marshes and lakes. The total cost of these projects will run to perhaps $400,000. They will enormously increase the waterfowl facilities of Iowa. They will have great value in many instances for upland game and for fishing; and every one will have great value for many non-game species of birds and animals, and also for the marsh fur-bearers. They will aid in the regulation of stream flow and hence in the maintenance of fish life. They will greatly increase the beauty of the landscape. They will be supplemented by the artificial lakes discussed in the next chapter. Also every farm pond, and every old or newly created river cut-off, with the aid of the game management staff, will be valuable, even though they are not wet every year.

But the program definitely submitted does not represent all of the opportunities for waterfowl improvement in Iowa by any means. The others it was impossible to find during the course of the conservation survey. The recommended general land and cover survey will discover them, and meanwhile individual projects will come to light from time to time. The staff outlined in the chapter on administration will be competent to deal with them.

Along the Mississippi several major waterfowl areas are crying for proper management. They may in some instances be affected by the nine-foot channel proposed by the federal war department. There is a possibility that the U. S. Biological Survey can handle them either under the migratory bird refuge act or under an extension of the authority of the Upper Mississippi Wild Life Refuge.* The latter is preferable since it makes possible regulated shooting on controlled areas, in addition to the establishment of refuges. Muscatine Slough and Keokuk Lake in Muscatine County and Odessa Lake in Louisa County fall in this category. If the Iowa-Illinois-Minnesota-Wisconsin inter-state park becomes a reality it will have great waterfowl importance in the lowlands and marshes of the river.

A drawing reproduced in Chapter VI illustrates in a sample, hypothetical situation, the principles involved in making improvements at a natural lake for all conservation purposes, — waterfowl, fishing, upland game, and general recreation. It also shows a rational division between refuge and public shooting areas for such a lake. In general it may be said that the ultimate plan should provide about twice as much public shooting area as pure refuge area, to maintain an appropriate balance between the two for Iowa conditions. Natural and restored lakes and marshes less than 200 acres in area should be refuges only, while those

* Mr. Ray Steel, Superintendent of this federal refuge has advised and assisted on these problems

larger than 200 acres may accommodate both refuge and shooting ground. The allocation of refuge and shooting areas on the state projects is a matter which must be worked out through experience on the larger lakes and marshes. Because of the dirth of natural sites, the south central section of the state needs waterfowl refuges and shooting grounds most urgently. The artificial lakes should all be refuges. The map here shown indicates the location of the waterfowl improvement projects recommended for state action. Supplemental reports give more detail on them. Here, well within the range of feasible expenditure from license fees, is a program to recover in some measure Iowa's earlier richness in migratory waterfowl.

MISCELLANEOUS GAME

If the woodlands of Iowa can be saved, the squirrels will apparently get along all right.

The cottontail rabbit is still abundant, but he is threatened by two dangerous diseases. Here research first and then management will be necessary.

The red fox is something of an enigma. He is apparently not in danger of extinction. But his role in the balance of wild life is not clearly determined. More research is required on the volume of damage he does by depredations, but it is probably less than is generally believed. Meanwhile he offers good sport in southern Iowa and he retains some economic value in his pelt. A policy has still to be determined after more study by the staff now set up. The gray fox offers little game or fur value and arouses little incentive to hunting. He probably needs no protection and can survive very well without it.

COMMERCIAL TRAPPING

The volume of the fur trade in Iowa is larger than might be supposed. In the fiscal year 1929-1930, close to $800,000 worth of furs were sold to dealers.

The state records show this total built up as follows:

Skin	*Number*	*Value each*	*Total*
Muskrat	466,914	$ .62	$289,486
Mink	31,647	7.00	221,529
Skunk	69,452	1.85	128,486
Raccoon	10,973	6.50	71,324
Civet	54,116	.63	34,093
Red Fox	1,611	12.00	19,332
Opossum	18,520	.60	11,112
Weasel	4,609	.76	3,502

Miscellaneous: Badger. Grey Fox, Beaver, Wolf, Otter and Rabbit.

Declining prices have reduced the total annual value since 1930, but the trapping of fur-bearers is still an important item of commerce, and may again become much more important.

No long-time records are available to indicate the history of commercial trapping in the state. However, the following item illustrates the enormous de-

dine: in one year, about 1900, the two largest dealer* in Spirit Lake handled about 200,000 muskrat skins, while in 1920 the largest remaining dealer bought and sold only 8,000. Both scarcity and lower prices contribute to the decline and all the evidence points to similar decreases through the whole list* of fur taken, with the possible exception of skunk, civet and rabbit, which do not shun a settled country.

And the reasons for the falling off in the supply of the wilder spedes of com mercial fur-bearers is obvious. In addition of the tendency for fanners to loll off the animals which they consider pests, the same forces which have driven out other forms of wild life, have also reduced the fur-bearer population, — the de pletion of the environment required for their life. Hence, the measures necessary to again increase the supply are largely matters of restoring and controlling the environmental conditions, where that is feasible.

The muskrat must have marshy places. Probably every marsh drainage project has destroyed colonies of muskrats. Likewise, every marsh which is restored and controlled is pretty likely to be populated by muskrats. Hence, the whole lake and marsh restoration and improvement program, and also the con struction of new lakes and power ponds, will aid the increase of this most valuable fur-bearer. The projects of this type recommended in the Plan will provide thousands of acres of muskrat habitat, in addition to their value for waterfowl, upland game, and general conservation in all its phases. It may be expected that thousands of muskrats will be produced on these areas. To be commercially valuable, arrangements must be made for the taking of the surplus crop by trap pers. The program, then, proposes that, as the areas are developed and placed under consistent state management to foster and protect all forms of wild life in a proper balance, the muskrat trapping rights be leased out under appropriate control. Even though in a sense incidental to the primary purposes in the lake and marsh restora tions, this muskrat policy should be valuable to the trapper and the dealer, and also to the state in the rentals received. Such rentals might cany a considerable part of the project cost.

An lows Duck Lots

The beaver and the otter, aquatic fur-bearers like the muskrat, are now so comparatively scarce that they should be en tirely protected against

• See "Production and Conservation of Fur Animals." F. G. Ashbrook. U. A Biological Survey.I

commercial trapping throughout the state. Further, the plan proposes a sanctu ary for beaver as outlined above, where they may be observed and studied for their zoological interest.

The second main group of fur-bearers are those which may be classed as "burrowing," not dependent upon marsh or timber for their homes. This group includes the skunk, the civet, and the mink and raccoon wherever the latter two utilize drain tiles and other hiding places in lieu of brush and timber. In-so-far as the *physical* environment is concerned, these species seem to be thriving pretty well and no action by the state seems necessary, except that protection by regulated seasons should be considered, especially for raccoon and mink. How ever. the reports are that many thousands of skunk, mink and 'coon (and also muskrats) are killed every year by dogs running at night, when the wild animals come out to feed. This presents a difficult problem of equity between conflicting interests, but the program should make serious effort to correct this source of damage, even though there is not now any visible means for doing so.

For the brush and woods-loving types, particularly the raccoon, and the mink to some extent, all those elements of the program which tend to restore and pre serve the growth of trees and brush in wild places will increase their habitable range and tend to increase the population and the surplus for trapping.

There are problems of disease and of the scientific manipulation of environ ment which come within the field of the wild life research established at the State College.

In order to comprehend and effectively work on any phase of the fur-bearer situation, a careful, complete census year by year showing the number of animals taken, is absolutely essential. With the cooperation of the dealers, such a statis tical record is now kept in the Fish and Game office.

A number of questions have arisen with reference to zones for trapping, seasons, etc. These are under careful consideration and a new policy is in process of formulation.

All told, the conservation plan will be a boon to the commercial trapping industry, the increase and stabilization of the supply of fur-bearers being one of the benefits derived from almost every element of the whole plan.

TRENDS IN HUNTING AND FISHING

Here, between the chapters on Game and on Fish Conservation, some signifi cant trends in the numbers who hunt and fish may be indicated. In 1931, 280,000 hunting and fishing licenses were issued.* Up to that time, there had been a fairly consistent increase in the total number of licenses sold. But in 1932, no doubt due to the reduced incomes of Iowa citizens, a sharp falling off in the number was recorded. We may expect the trend to go upward again when times are better and as a result of the program now undertaken by the Fish and Game Commission.

***In low* one tomr coven both hunting and fijhmg.**

However, there is probably a saturation point beyond which it is unwise to expect the number of licenses to increase. The ratio of licenses to total population for the country as a whole would be a significant indicator. It is difficult to grt comparable figures, because about half the states issue separate licenses for hunt ing and for fishing. In the neighborhood of ten million licenses of all kinds were sold in the United States in 1931. To be comparable with Iowa' s, this figure must be reduced to about eight million, or a ratio of about one license for every sixteen persons of total population. The ratio in Iowa is about one license for every ten persons living in the state, or fifty per cent greater than the United States ratio. On this basis we cannot expect the Iowa ratio to increase very greatly beyond one to ten. One-third of the 1930 male population of Iowa over sixteen years of age would make a total of about 300,000. All told, we may expect not over 300.000 to 350,000 double licenses to be taken out annually at the saturation point. With separate licenses for fishing and for hunting, the total might run to 400.000.

The proportion of license takers in the older age groups tends to increase in Iowa, corresponding to the increased proportion of those groups in the total popu lation. This trend in itself if continued would eventually lead to a decline in the number of licenses issued. But that tendency we may expect to be counter-acted by the greater attractiveness of the fishing and hunting facilities now to be pro vided.

It is interesting to note that the proportion of farmers taking fishing and hunting licenses, as compared with urban licenses, tends to increase despite the decrease in the ratio of rural residents to urban dwellers. The fish and game commission programs are relatively of greatest importance to the rural population.

In thousands of cases, fishing and hunting are only the direct incentive taking men and women and children out to enjoy all sorts of countryside recreation. The fish and game division of the conservation plan, therefore, recognires the tremendous numbers who crave contact with nature and wild life otherwise than for fishing and hunting, and also the secondary, perhaps most important, values of general conservation to the sportsman himself. The direct game program, plus the fisheries program, with its wide values, would not in themselves con stitute a just proportion of the conservation plan for the Fish and Game Com mission. But the corollary values, and they are very great, of the cover restora tions, the lake and marsh restorations, the construction of artificial lakes, im provements at natural lakes, and the sanctuaries and refuges and points of public access to lakes and streams, along with the direct fish and game purposes, do constitute a balanced, well-rounded program for this *conservation* agency, the Fish and Game Commission.

A Typical Drained Duck Lake *Eligible for Restoration*

CHAPTER X

THE CONSERVATION OF IOWA'S FISHERIES RESOURCE

I r
rpf / Fishing as a sport needs no defense. Perhaps no other form of *active* out* door recreation is so widely popular, and no other takes so many men. women and children out into the open. Very often the catch is unimportant, pleasure being derived from the mere delight of being at leisure outdoors. The familiar quotations are not without significance: "Sometimes, while fishing, I set and think, and sometimes I just set;" and "The fishing is good even if the catching is poor."

Originally Iowa was richly endowed with fish life. That rich endowment has been seriously damaged by the effects of human living. The efforts to restore good fishing have not always been well directed, and energy and money have been ineffectually spent for lack of sound technical knowledge applied to the problems. Fishing technique is the most complex and difficult of all the phases of conserva tion; but expert management, the basic requirement for successful fisheries develop ment, can bring Iowa's fish resources up to a point equal to or even exceeding that of the original condition here. And this can be accomplished at a reasonable cost. Iowa can, under the Conservation Plan, provide some good fishing for every citizen and for every visitor.!

The fisheries surveys were made largely under the direction of Dr. Carl L. Hubbs, head of the Institute for Fisheries Research at the University of Michigan. Most of the material in this chapter is taken from Dr. Hubbs' reports. Valuable assistance was rendered by the staff of the Iowa Fish and Game Department, notably by Mr. W. E. Albert, State Game Warden until the time of his death in the summer of 1932, Mr. Ves Baur, Manager of Fish Culture, W. E. Albert, Jr., Harry Hart, I. T. Bode, the present State Game Warden, and others. The State Health Department loaned Mr. William Mark for work on the survey, and that department made available much valuable data. Dr. Hubbs' assistant. J. C. Salyer, now in the faculty of the University of North Dakota, added invaluable assistance of the most technical and practical nature. Cooperation from the U. S. Bureau of Fisheries provided general advice from Mr. Lewis Raddiffe, As sistant Commissioner, assistance from Dr. A. H. Wiebe during the early days of the survey, advice of Capt. Culler and Mr. Canfield of La Crosse, and an advance report on the Mississippi from Dr. M. M. Ellis. The work and advice of others, particularly Dr. G. W. Martin of the University of Iowa, and Dr. G. W. Prescott of Albion College, both on lake problems, have cleared up difficult points. Many fishermen, especially Mr. Frank Mamette of Spirit Lake, have contributed valuable information on local situations.

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waters, two major branches of the greatest river on the North American conti nent. The many glacial lakes which beautify the prairies of north central Iowa carried their quota of aquatic life. A score of streams which contribute their waters to the two big rivers also swarmed with fish life; a major element in the support of the Indian and the white pioneer. North of the deep loess territory, over at least half the area of the state, these streams provided very satisfactory conditions for their large population of that regal fish, the small-mouthed bass. And the brook trout, a rival to the claim of being the leading game fish of Ameri can water-courses, was native to the smaller spring-fed streams of the north eastern comer of the state.

THE DESTRUCTION OF FISH LIFE

Iowans. like their brothers in other states, have proceeded with reckless abandon in the destruction of this endowment.

1. Lakes and permanent marshes have been drained.

2. Creek and river courses, well adapted to the feeding and protection of an abundant fish life in their lateral bayous, bends, holes and coverts, have been all but ruined for fish life, by ditching.

3. All the streams of the state, unditched as well as ditched, have been made over into a less satisfactory fish environment by the excess silt and sand which has been wastefully allowed to wash off the land. The Mississippi and Missouri rivers are being especially affected in a harmful way. by silting. The lakes too are suffering, including the artificial lakes.

4. Some dams, unprovided with any really efficient fish passes, have further contributed to the damage. The migratory fish have been hindered in reaching their spawning grounds, and their young have been restrained from the natural downstream migration, which may be of equal importance. However, the effect of such dams should not be over-emphasized. Sixty years ago, when fishing is reported to have been good, there were more than 500 dams on Iowa streams, as compared with about seventy at the present time.

5. As though not content with the destruction of the feeding grounds and the coverts which sustain the fish life on the rivers, man pours into the streams the waste products of his life and his industries. Thus the aquatic life is often smothered, for sewage consumes the life-giving oxygen.

6. Soil erosion and pollution, together or separately, have brought such an increase in the fertility of certain Iowa lakes as to place them in a condition of biological instability.

7. *The depletion of Iowa's fish stock has been abetted by ineffective management of this resource.* Violations of the fishing laws are common; some unwise laws have been enacted. A few undesirable species of fish have been introduced. Fish culture has not been efficiently developed. Those intrusted with the administration of the state fisheries have not always been capable of solving the intricate technical problems. These are blunt criticisms, but, we are convinced, true ones.a

COMPATIBILITY OF HUMAN AND FISH INTERESTS

It does not follow that human life, in its present abundance, activity and complexity, is incompatible with the conservation and development of fish life. If a reasonable share of the very power and energy, wealth and intelligence that have led to the development of Iowa and the destruction of fish life can be diverted into conserving the aquatic resources, they may be saved from further depletion. Passing beyond this limited goal of conservation, we may with confidence plan to *increase* the supply of fish life back to the primeval abundance which pioneers enjoyed, *and possibly beyond that to an abundance surpassing anything which the Indian ever saw.* Such an increase in the fish supply of the state can be accomplished even in the face of an increasing human population, and the attendant increase in fishing. A twenty-five year conservation plan must set its aim that high.

RESTORATION MEASURES

1. Many of the lakes are recommended to be restored to something approaching their former depth and richness, leading to a great increase in numbers of fish as well as of other wild life. See Chapter VI for details.

2. Some few ditched streams, where compatible with agriculture, may be allowed to return to a meandering course, and this return may be accelerated by introducing barriers to the stream flow. Thus the mileage and area of habitable water may be increased, and stream-side bayous will be reestablished.

3. The silting nuisance can be alleviated by a long-term program of erosion control. See Chapter V.

4. The damming of the streams can be turned into *benefit* instead of harm, primarily because the damming in itself greatly increases the water volume available for fish. Progress is being made in developing really effective fishways. Ponding streams also favors erosion control, and helps to prevent excessive flooding.

5. The sharp fluctuation of stream flow can also be somewhat reduced by operating the outlets of lakes so as to increase their storage capacity. See Chapter VI.

6. The pollution evil certainly can be checked during the next decade or two. By proper sewage treatment, the oxygen-consuming capacity of the wastes can be so reduced that none of the streams of the state will be robbed of the life-giving trace of oxygen which is soluble in water. This can be done without removing the nitrogen, phosphorus, potassium, and other elements of sewage effluents conducive to plant growth. These fertilizing substances, other conditions being satisfactory, may make a stream *more productive* of fish life than in its pristine state.

7. The fertility of certain Iowa lakes should be regarded as a blessing from some standpoints. Investigation must eventually lead to dependable methods of controlling the algal nuisance which often results, and the high fertility can then be directed by proper management methods into fish production.

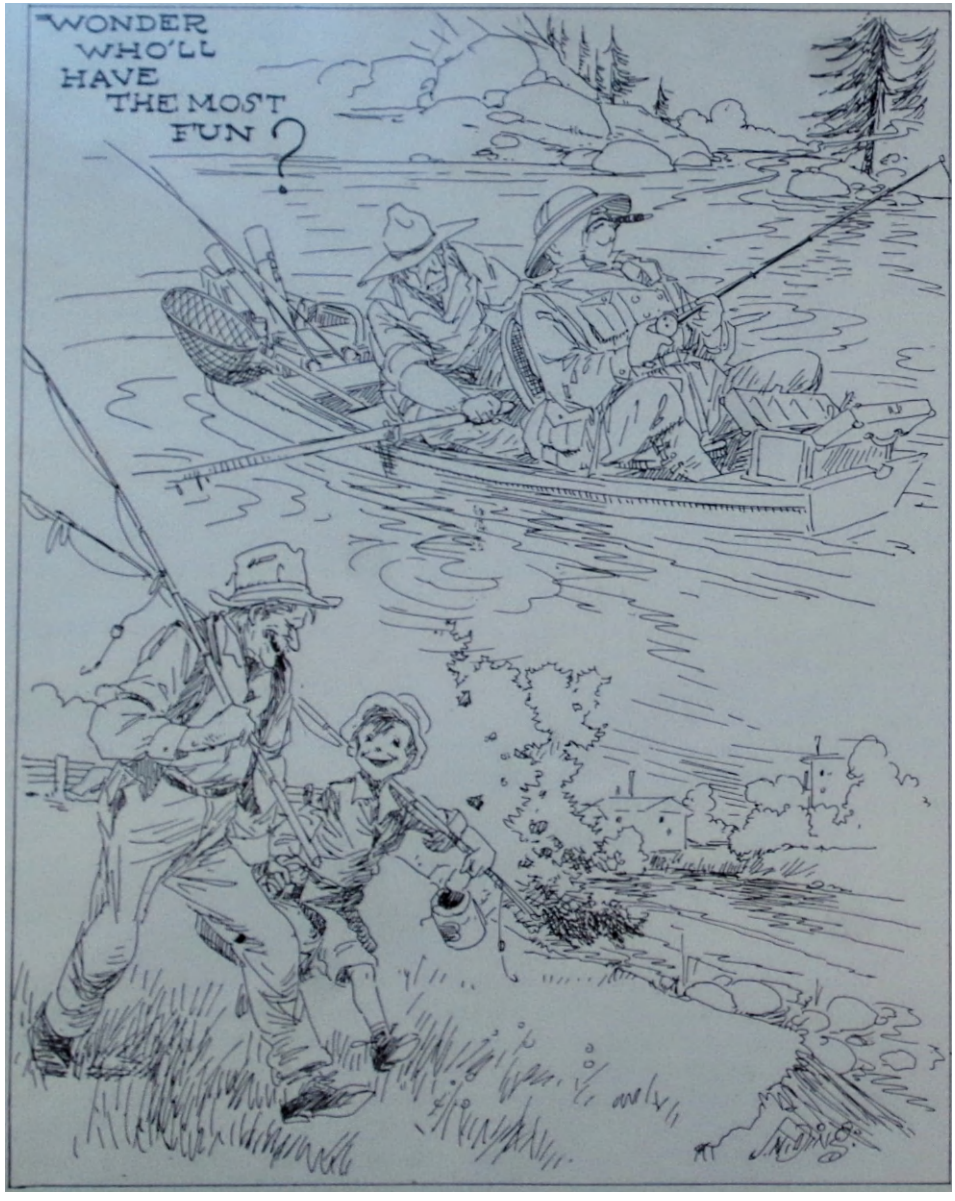


PLATE XXXIX — GOOD FISHING SHOULD BE AVAILABLE FOR EVERYONE IN IOWA -
Courtesy J. N. Darling

8. Certainly an improvement in the *management* of Iowa's fish resources is possible, and in order. For example, the further spread of undesirable fish, such as the dwarf orange-spotted sunfish, formerly taken in the fish rescue work, can be much reduced, if not eliminated. Fish cultural practices can be further improved, so as to control diseases in hatchery stocks, to increase the output of the hatcheries, to increase the number of rearing stations and to extend fish culture into new fields, such as the large scale production of small-mouth bass fingerlings. Separate reports describe the details involved.

To conclude: it is wholly possible to conserve and even to increase the fish supply of Iowa, in the very face of an expanding population and of an increasing drain on this resource. This happy ideal cannot be realized through any waving of the magic wand of science; nor through wholesome sentiment or well wishing: nor through the preaching of conservation; nor even through diligent surveys and thoughtfully drawn up plans for the future. All these forces are needed and will help. But the real task and responsibility must rest on sincere and able fishery administrators, aided by and utilizing the conclusions of sound technical investigation^

FISH CONSERVATION AND OTHER CONSERVATION PLANS

It is obvious that plans for conserving and upbuilding the fish supply of the state are intimately related to other items in the Conservation Plan. Restoration of lakes, control of erosion and silting, construction of artificial lakes, pollution control, algal control in lakes, improvement and extension of the conservation administration and conservation education all are related to fish increase, and to the general building up of recreational interests and values. Fish problems and fish conservation plans should never be thought of alone: they are an integral pari of the general conservation problems of the state, and of the twenty-five year conservation plan.

CONTINUED SURVEYS AND RESEARCH

| As a basis for sound fish management in Iowa, the state should sponsor con tinued fisheries surveys and research. These investigations must be coordinated by a technically competent official trained in the methods of modem fisheries re search, with assistants, perhaps fellowships, in one or more of the colleges or uni versities of the state.

Points in obvious need of research include such items as rate of growth, spawning age and size, characteristics at maturity, limits of spawning season, ratio of catch to fish population, predacious fishes, effect of seining upon the valuable acquatic plants, etc. Even though some of these problems may have been studied in other states, they must be investigated carefully and at length in Iowa. Answers to these problems for Iowa must be obtained in Iowa. These answers are needed to determine the most desirable size, season and bag limits; the importance and even the desirability of closing refuges in lakes and nursery feeders to trout streams; the exact location of such refuges and nurseries; the removal of obnoxious fish, to the best general value; the degree of protection to

be accorded the predators, etc. No hasty survey can provide satisfactory answers to these questions. The best available technical help must be engaged, and held, on these problems.)

FISH CULTURE

Experience has taught us one vital lesson in fish conservation: needful as are the enforcement of sound restrictive regulations, these alone are quite insuf ficient to hold back the flood of depletion. Other measures of control must go hand in hand with regulation and enforcement, if we would check fish depletion.

The chief additional means which has been employed to conserve and develop fish supplies is *fish culture.* Developing fish culture in Iowa to a state of high efficiency and the greatest economy compatible with an active building up of the fisheries, will also demand extensive and long-continued research. For these investigations, also, the employment of technical help either in the state office or in the college or university is called for. Lines of fish cultural investigation and observation in Iowa are outlined in supplemental reports.

STOCKING POLICY

(This is a matter of fundamental importance. As a basis for a *stocking budget* there must be continued to a reasonable state of completeness a thorough FISH SURVEY of the state. The resulting *inventory* of the lakes and streams of the state must be kept up to date, all changes in the lakes and streams and in their fish fauna being tabulated. This will give a check on the success of plantings and other management practices. Conducting the state fish operations without lake and stream surveys and inventories, and fish budgets, is equivalent to at tempting the conduct of a business without any market analyses, without any inventories and without schedules of production. Lack of competition may be the reason why state fish operations have not gone bankrupt.

The *fish survey* should determine for each water: the physical and chemical characteristics; the available food supply; the species of fish already present and the abundance of each; the growth rate of the fish, in reference to population, intensity and carrying capacity; the fishing history of the lake or stream and its present fishing status; the species of fish adapted to each body of water; the num ber of fish of each species and age which need to be stocked to increase or at least uphold the fish stock. The success of the program over the state will be deter mined from the expanded and continued creel census already begun.

Another source of improvement in fish cultural activity in Iowa would be a closer cooperation with the work of the U. S. Bureau of Fisheries. In developing and holding this cooperation a technical staff should be of help. 1

ENVIRONMENTAL CONTROL

By all the means above recommended, no matter how extensively employed or intelligently administered. Iowa can not expect to attain the twenty-five year goal of producing more fish in its lakes and streams than were produced in the pioneer days. Another weapon must be brought into use.

This newer means of increasing fish life, is that of environmental control If the lakes and streams of Iowa are to produce more fish than they did in their original condition, *they must be made more suitable for fish life.* This is the meaning of and the reason for environmental control.

The fundamental phase of environmental control for the fish of Iowa ipfrf* and streams lies in correcting the abuses by which the aquatic resources of the state have been destroyed. This, as already indicated, involves the restoration of drained lakes; removal of rough fish; checking the silting of the streams; in stalling fishways in dams, and making the best use of the impounded water; and correcting the pollution evil, but retaining as much of the basic fertilising material as the water receiving the sewage can utilize to the advantage of its fish supply.

Beyond the mere correction of abuses lies the conscious creation in Iowa lakes and streams of conditions more favorable to the protection, growth and production of fishes. This is the contribution of contemporary technical fishery workers to the cause of fish increase. It is the hope of the future, the basis for our belief that it is still possible to increase the fish output of the lakes and streams to a point equalling the primeval abundance.

There are many means of improving the lakes and streams of the state so they will carry and produce more fish life. In the first place more water can be fur nished by damming the streams and by raising lake outlets. In addition to merely supplying more water, other conditions can be altered to add to the fish production. For example, cover for shelter can be added where insufficient, to function in the same manner that better cover on land does for the increase of game. Where spawning grounds are lacking, they may be provided, in form of gravel, slabs, or whatever material is used for spawning by the species whose increase is desired. The food supply can be increased in a number of ways, for instance by increase of the minnow life in a lake. The length of trout-habitable water in the headwaters of Iowa streams may be increased by planting stream-side shade.

To make full and efficient use of this new method of increasing fish production. Iowa should employ technical help trained in modem fisheries methods; include in the fish surveys and inventories data for each body of water on what is lacking or deficient for maximum fish production; determine how these deficiencies can be met; and proceed to modify the environment accordingly.

By combining the beneficial effects of sound laws and regulations, adequately enforced, expanded and improved fish cultural operations, the correction of the misuses to which the lakes and streams of the state have been subjected, and the conscious improvement of the lakes and streams to make them better suited to the protection, growth and reproduction of the valued fishes. Iowa can. if it so wills, attain the goal of increasing its fish production beyond anything previously experienced.

THE FISHING AREAS OF IOWA

As an aid to fish management in Iowa, it will prove helpful to classify the waters of the state into five fishing districts. Each of these areas has outstanding problems, which call for extra emphasis on one or more of the specific means pro-

posed to build up the fish supply. Each of the areas, however, shares to some degree every one of the problems which confront the whole state.

THE COMMERCIAL FISHING AREA

This area involves the Mississippi and Missouri rivers and adjacent bottom lands, along the eastern and western margins of the state, and also such other rivers or portions of rivers, if any remain, as may be utilized for commercial fishing or clamming.

A "Survey of Conditions Affecting Fisheries in the Upper Mississippi River" has been made by Dr. M. M. Ellis of the United States Bureau of Fisheries, and published by that bureau as Fishery Circular No. 5, September, 1931.

From Dr. Ellis' s findings which were made available for this report, certain policies emerge as fundamental in dealing with the Mississippi River situation:

1. All sewage entering the river from Iowa must eventually be treated to render it relatively free of solid matter, excess oxygen-demand and pathogenic bacteria.

2. Erosion control must be effected, particularly on the steep river banks. See Chapter XI.

3. Acquisition by some public agency of the rich overflowed shallows. See suggestions in Chapter X.

4. Cooperation with neighboring states and the federal bureaus.

5. Extension of fish rescue work in the overflow lakes, improvement on the methods used (both for efficiency and economy), and better cooperation with the Bureau of Fisheries.

6. Better provision for the passage of fish over the dams, in cooperation with the other states and the federal government.

7. Development of fish culture for such river fishes as would appear to benefit therefrom, similarly in cooperation with other states and the Bureau of Fisheries.

8. Cooperation with the Bureau of Fisheries in efforts to rebuild the supply of freshwater mussels.

9. Processing the mussel meats into meal for fish food in the hatcheries.

10. Extension to the *Missouri River* of those actions designed to build up the fish supply, and of rescue operation, *if surveys and trials prove this practicable.*

A long battle is ahead of us on the Mississippi and the Missouri.

THE SOUTHERN FISHING AREA

This area may roughly be defined as the Missouri River drainage basin south of Sioux City and the Mississippi drainage basin south and east of Des Moines. It includes also a number of streams scattered through the small-mouth bass and the trout fishing areas, and more or less of the lower courses of most of the large tributaries of the Mississippi north of Davenport. Eventually some of the streams within this area may be redeemed for small-mouth bass through the elimination

of pollution and the control of erosion. The streams of the area now provide little fishing, except for catfish and bullheads.

The limits of this fishing area are not very sharply defined, although they rather closely coincide with the area of the state most deeply buried by loess. Its characteristics are determined by excessive silting of the streams, and by tremendous variation in stream flow without a well sustained low-water flow. Ditching has been combined with *erosion* to turn formerly hard-bottomed streams in this area into muddy runs. Fundamentally the improvement of these streams must rest on erosion control. Some recuperation will follow from allowing the streams, wherever at all compatible with agricultural interests, to revert to a meandering course, with the bends and holes and snags and overflow shallows which are conducive to fish increase.

The return of the streams to a natural condition can no doubt be accelerated by placing barriers in the right way to produce the meandering course. Means can probably be devised for holding in place through the floods other improvement devices such as hole-digging deflectors, coverts of logs and brush, old tiles for cover and for catfish spawning, etc. But all of this cannot be expected to provide better than second-rate fishing (bullheads and catfish mainly) in these southern streams.

The prime possibility for fishing betterment in the southern area is through the construction of artificial lakes. These will aid erosion control, furnish general recreation, etc., but their first value will probably lie in their fish resources. Therefore, great care should be taken to so construct these ponds as to make conditions suitable for fish. Important specifications are:

1. Sufficient depth to support fish life in winter and to provide cool holes in summer — not less than 15 feet at the dam.

2. Cutting down trees that would be killed, removing large logs if desired, but wiring finer branches onto large ones and weighting these or staking them so they will lie just under the level where ice will not destroy them. These will provide fine shelter for young fish, and also increase the food supply.

3. Leaving live brush in the lake bed for fish shelter.

4. Planting and controlling the vegetative growth.

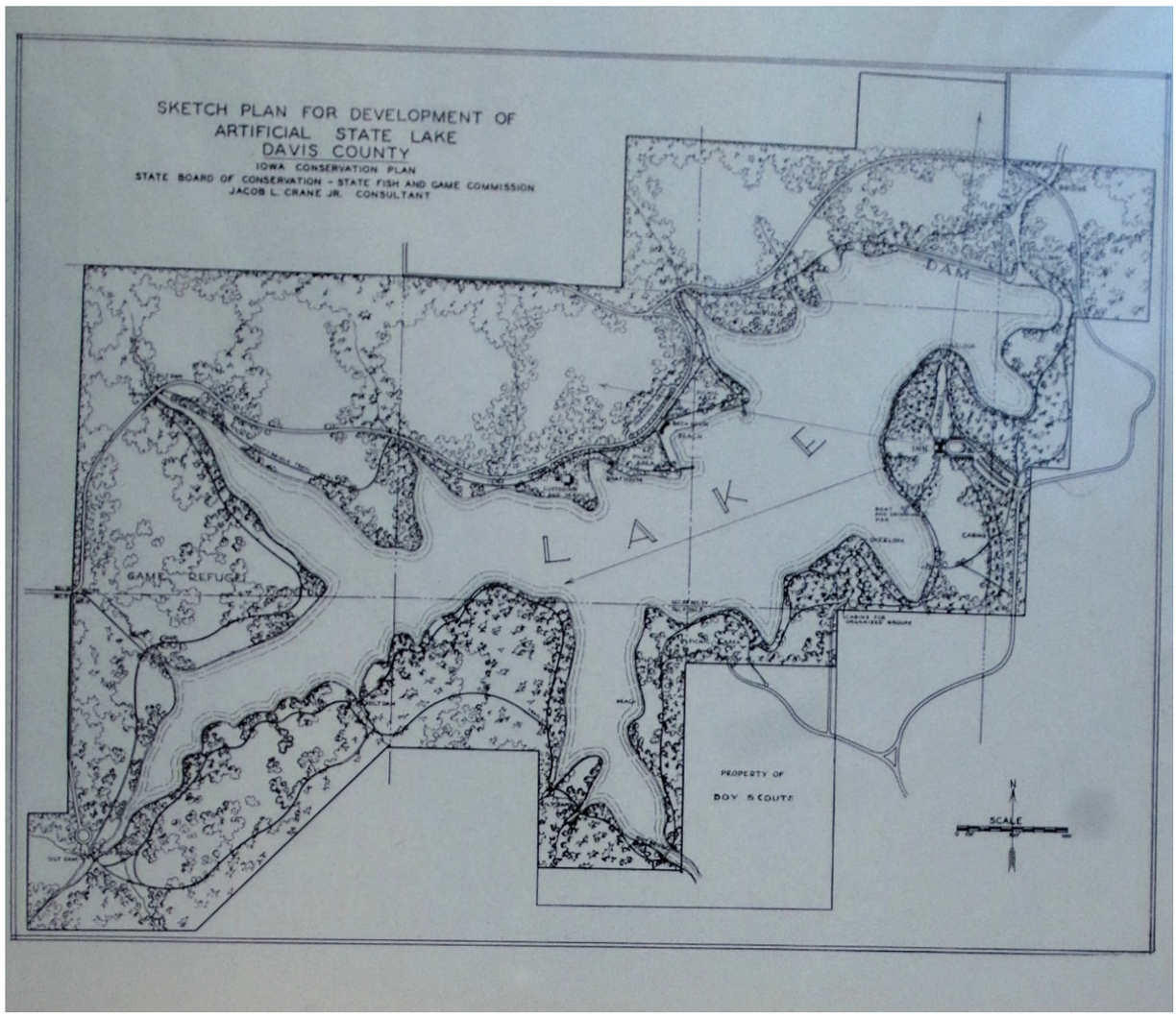
5. Stocking the ponds rather heavily with game and pond fish, particularly (and generally) with large-mouthed black bass, crappies, bluegills and the larger species of bullheads *(not the dwarf black bullhead of the region).*

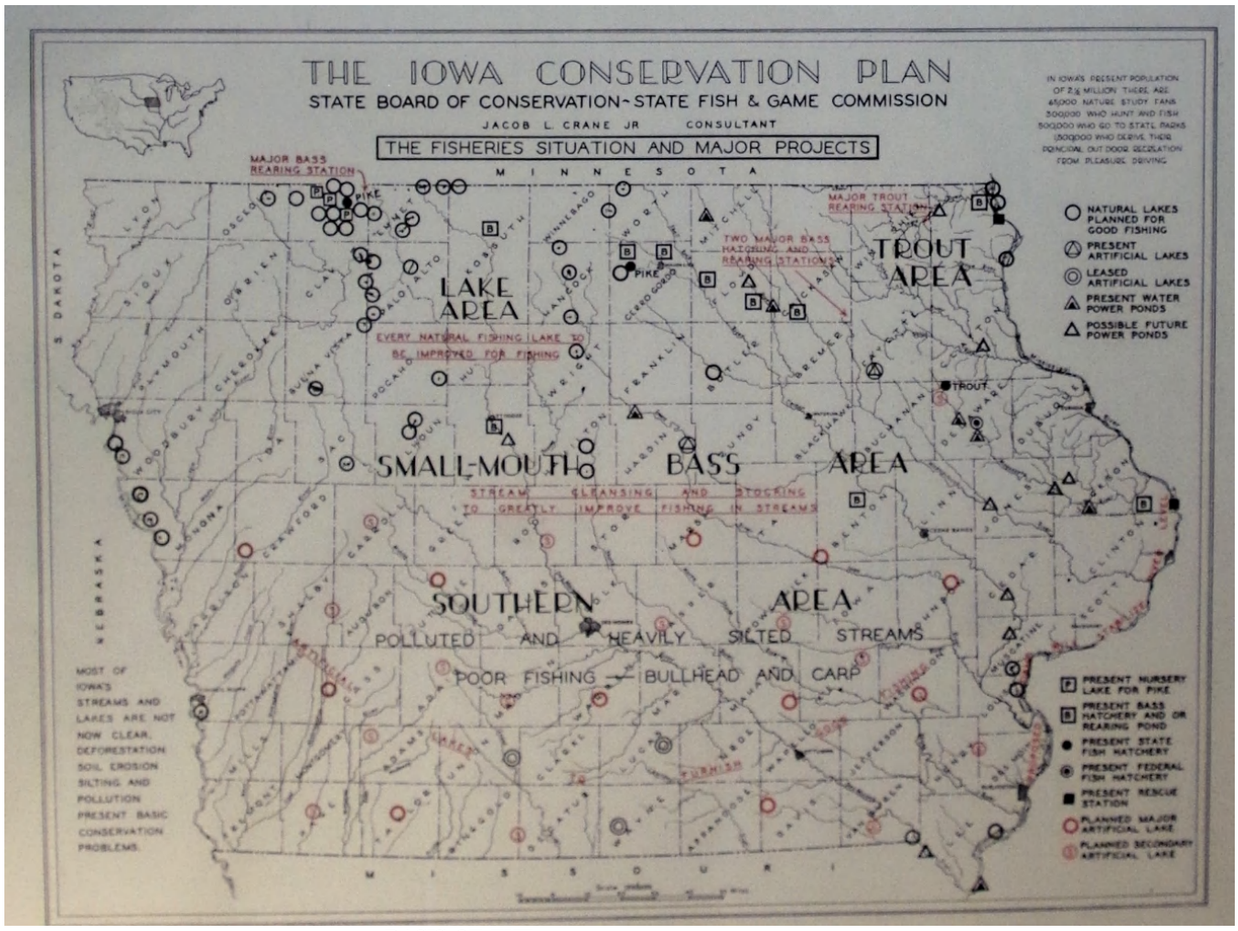
ARTIFICIAL LAKES

The south half of Iowa is lakeless; and the streams are muddy and polluted. The logical means to provide good fishing is by the construction of artificial lakes. The railroads and some municipalities throughout this territory have been driven to building ponds and lakes for water supply. Some of them now provide good fishing, even though they have not been subject to scientific fish management up to this time.

To meet the fishing requirements of south Iowa. then, as determined by the fisheries survey, the central staff of the conservation plan has made a special

PLATE XL THE FIRST NEW ARTIFICIAL STATE LAKE





PLATK XU THE BASIS OF THE FISHERIES IMPROVEMENT PROGRAM ALSO INVOLVES FISHERIES MANAOBMENT FROM SEVERAL HIGHLY TECHNICAL ANOLES

study of the whole artificial lake situation and possibilities. The results of that study follow:

For fishing purposes, the first artificial lakes should be spaced about forty miles apart in each direction, all across the south half of Iowa. This will make the average distance of driving to a lake by road about fifteen miles and the maximum distance about twenty-five miles. This is a short haul, and the *first lake projects need not be spaced closer than forty miles apart.* But they must be located in a fairly even geographic distribution, and the distribution must also recognize the prospective tributary population, the present fisheries situation, and a proper relationship to other projects such as existing lakes, state parks and preserves, etc.

The specifications for the artificial state lakes, derived from a careful study of all the requirements in the Iowa situation, and with a view to keeping the total cost within a reasonable range are: A depth of fifteen to thirty feet at the dam; a watershed large enough to insure an adequate water supply, but not much larger; a watershed as largely wooded or pastured as possible; woods around the lake site; cheap land; a good dam site and good material for dam construction; and accessibility by all-weather roads and preferably by a primary highway.

After studying scores of sites and after much adjustment and readjustment in the designation of locations, a plan for twelve new primary artificial fishing lakes is recommended for action by the Fish and Game Commission. Their distribution is indicated on the accompanying map. which *does not* show their

Aerial View of Site of Daria County Artificial Lake

precise location. Also are shown the several more important existing lakes which affect the distribution of the new ones. Duck Lake. Van Buren county, lies within the Farmington State Park. The lake at Thayer is now under lease by the state; the lakes at Allerton and Williamson, both good ones, may be leased from the Burlington Railroad.

In order to save cost on land purchases and to give easier administration and more effective use, two of the lakes may go in existing state areas, Springbrook State Preserve (King Park) and Pammel State Park. And one may go in a future state park somewhere along the Boyer River.

From the standpoint of serving a large unserved area, the most important projects are the lakes in the southwestern counties. In that section of the state, the spacing can be wider because of the relatively thin population density, but on the other hand it is almost devoid of outstanding scenic and natural features, and therefore requires special consideration.

The gravest problem in building these artificial lakes is that of controlling erosion and silting. This matter has been carefully considered and a special tentative survey was made by George Marston of the State University covering seventeen existing artificial lakes and ponds in southern Iowa. Generally it is safe to conclude that reasonable erosion control will give the proposed lakes a useful life of twenty-five to fifty years. But in the extreme southwestern counties the data is not yet conclusive. Hence, further study will be required before the southwestern projects suggested in the preceding paragraph are undertaken.

The territory lying between the natural northwestern lakes and the western state boundary has poor fishing possibilities. But this district possesses virtually no good "made" lake sites. And further it lies within fairly easy reach of the big state lakes, which, with the improvements recommended, will be superior to any artificial lakes.

No major or secondary artificial lakes are proposed in this program for the counties bordering the Mississippi River from Clinton to Keokuk, because the river itself will presumably furnish increasingly good fishing, because the im provement of such areas as Green Bay and Muscatine Slough will provide some fishing, because there are some little fishing lakes available, because the territory is not far removed from the planned artificial lakes a little further inland, because some major water power developments may be in line there, and because the canalization of the Mississippi, if and when carried out, will create a better fishing area than can be built inland. In case these considerations prove inade quate, one or two artificial lakes may later be required in this strip of territory.

The first of the twelve major fishing lakes is now under construction in Davis county. Here one of the best sites in the state has been found and in a year or so a 350 acre lake will furnish a wide variety of recreation.— the Okoboji of south eastern Iowa. The dam is forty-five feet high, the lake nestles among wooded hills. The site is so ideal that the cost, proportionately, is very low. A sketch plan is shown.

These made lakes will furnish excellent fishing — bass, sunfish, crappies. They will serve as waterfowl refuges. Some offer sites for inns and cabins and

for bathing beaches, swimming and boating, fine picnic and camp grounds, and winter sports. They may have some prospective value for future water supplies. Not least, they will augment the beauty of the southern Iowa landscape.

Since their general recreational value is so great, the Board of Conservation may be the logical agency for managing some of them in that field.

The total cost to the Fish and Game Commission for the twelve first to be undertaken will be about $500,000. Their complete success depends upon se lection of good sites, good engineering throughout, skillful fish management, from the preparation of the bottom to the regulation of fishing, sensible developments for general recreation, attention to waterfowl requirements, and consistent and intelligent general administration. The staff recommended, and now in process of development, will be competent to handle all these phases.

No other conservation project in southern Iowa will be so valuable to the people, and the constant pressure for securing lakes in several localities is forceful evidence of that fact.

The policy established in dealing with the lake in Davis county may be fol lowed. with variations, on the succeeding projects, namely that of calling for a contribution of from one-quarter to one-third of the cost from the people of the territory.

SECONDARY ARTIFICIAL LAKES

It is expected that the made lakes will be so popular that more than twelve will be demanded. Further, it is altogether possible to construct at small cost a number of little ponds which would not qualify as major artificial lakes, but which would serve a very useful purpose lying between the major sites. Hence, a pattern of secondary lakes is shown on the map of artificial lakes, not to indicate their specific locations, but to illustrate a rational distribution.

It is not an overestimate to anticipate that the insistent popular demand will require thirty artificial lakes, or even more, during the next twenty-five years, and that up toward a million dollars can be wisely spent in providing them.

THE SMALL-MOUTH BASS FISHING AREA

North of the southern fishing area just discussed, excluding the glacial lakes and the northeastern trout streams, is an area where the streams are in large degree either actually or potentially supplied with game fish other than catfish and bullheads. The small-mouth bass is the most important of these. The streams involved are portions of all the major Mississippi tributaries, from the Upper Iowa to the Raccoon. Prospects are also considered good for developing bass fishing in parts at least of the northern tributaries of the Missouri including the Big Sioux and Rock Rivers, and Mill Creek, tributary to the Little Sioux.

Erosion, flood and pollution control are tremendously important considera tions in the upbuilding of bass fishing in this area, as for the state as a whole. But the specific need of this area, the outstanding fish cultural need for the state in fact, is adequate provision of proper ponds for hatching and rearing of bass. At least three stations wholly or partly for this purpose are recommended. One

of these should be a nursery lake, probably in Dickinson county. Two at least should be located toward the eastern side of the bass territory, in the "Driftless Area," to obtain pure water and to avoid excessive floods. These three stations should each have a minimum of ten or fifteen acres of pond surface. Smaller supplementary rearing projects, under local control may be added to the system. Further details are given in supplementary reports.

THE TROUT AREA

| A considerable proportion of the streams of the so-called "Driftless Area" in the northeastern comer of the state, arise in dear springs from the limestone bluffs which line the valleys — good trout streams. These arc largely in Winneshiek, Allamakee, Fayette, Clayton and Delaware counties. In other nearby counties, such as Black Hawk, Cedar and Jackson, there are also some potential or actual trout brooks.

Erosion control is important in this area also, to lessen the amount of sand and mud being washed into the streams, where it fills up the holes and levels off the bottom, smothering out the natural trout food.

The outstanding possibilities for increasing the trout supply lie in stream improvement. In most Iowa trout streams which were examined, the greatest need is for more adequate cover and protection. This can best be provided by propping up limestone slabs, and by constructing log and boulder covers, especially in holding-basins made by throwing small stone dams across the streams. The impounding of cold brooks by large dams to produce trout pools or lakes is in general not recommended for the area, because the streams warm up all too rapidly as it is, from exposure to the hot summer sun of Iowa. Certain of the streams, flowing into non-trout or quasi-trout waters, may be so dammed to good advantage. To hold down the temperatures of the stream where they are exposed, the planting of willows and other stream-side plants is urged.

The limited mileage of trout streams in Iowa, and the excessive floods which tear down most of them after freshets, call for the planting of a large proportion of the hatchery trout at a legal or almost legal size. This involves more rearing facilities, mainly a large rearing station in Winneshiek county or dose to it. and for the distribution of yearling fish throughout the summer. Planting of the fish solely after the close of the trout season, thus subjecting them to a winter and to spring floods before the opening of the season, seems to be an unsound policy, not to be continued unless tests prove it necessary.

One of the southern artificial lakes, in Springbrook Preserve, may be used for trout, since it will be fed by comparatively dear and cold springs and seepage water. At Backbone State Park, a trout lake is a definite possibility. At Bixby Preserve there is another opportunity. And several other spring-fed ponds may be constructed at points indicated in special reports. 7

THE LAKE FISHING AREA

This area indudes the lakes (but not the streams) of the north central prairie region, which is mapped as the Wisconsin Drift.

These lakes are among the most productive in America. They are in fact so rich in fertility as to be in a condition of biological instability. Small changes in conditions suffice to throw them out of balance, generally in the direction of the excessive growth of obnoxious algae *(Microcystis* and particularly *Aphanizomanon).*

The outstanding need of this area is the improvement and diligent management of the lakes, to insure good fish crops with a minimum danger of algal nuisance. This can only be done following or in connection with continued studies of the algal problems. The use of an algae-eating fish (the gizzard shad) appears particularly promising as a means of holding down the algae, transforming it into food for the larger fish. Experience in Ohio and other states confirms the belief that this fish may contribute to the solution of the lake problems. Preventing the wading of cattle in the lakes and the stopping of bank erosion are integral parts of the Iowa Conservation Plan. (See Chapter VI.)

The improvement of the lakes in other ways should be undertaken. The means include: providing brush shelters for the protection of young fish and for the attraction of larger ones; increasing the food by introduction of blunt-nosed and black-head minnows and by providing spawning slabs for their rapid reproduction ; and by increasing the weed beds where they are deficient.

Attention must also be given to the better and closer management of the nursery lakes. At least one of these should be devoted to small-mouth bass rearing. for stocking the lakes, (and also the streams), of the region.

PUBLIC ACCESS TO STREAMS AND LAKES

• (No matter how good the fishing in Iowa' s streams and lakes may be, it is of little value unless people can get alongside or on the water with a rod. Public ownership of the water and the bed of a river or lake to the meander line or high water line does not help much where the access through abutting private property may be and often is cut off. The Conservation Plan takes this matter as an important problem and recommends some 250 points of public access to, in most cases, fishable lakes and streams. This figure excludes the artificial lakes, which will automatically provide public access; but includes those places where shore lines are partially or wholly included within state parks, various state preserves, game refuges, public shooting grounds, and roadside parks. These 250 points will enormously improve the facilities for reaching the water to fish^sBut they are not sufficient. Iowa needs a system of public easements along its bwer fishing streams. As in Connecticut*, these may be acquired at nominal cost along hundreds of miles of river bank. Such easements tie in with the project to improve the banks by planting, etc., as outlined in the chapter on the conservation of Iowa' s soil.

Here then, in brief, is an outline of the program to bring Iowa' s fishing back to a point equalling or exceeding its original richness.

The State of Connecticut has acquired 150 miles of stream bank fishing easements and rights-of-way. At first they were leased for one dollar a year. More recently they have been purchased at low cost.

CHAPTER XI

STATE PRESERVES AND STATE PARKS

Deep and unforgetable is our love for the wilderness. Human beings crave that serenity and peace which come to them only when they look upon nature's own works. Whether we live in the city or in the country, nothing to re-creates us as a return to the unspoiled marvellous variety of the hills and plains, the woods and waters, as shaped by *natural* forces. That kind of recreation, which is dependent upon the opportunity to take one' s time in beautiful and interesting natural out-door places, cannot be provided by the city park. Rarely can the counties provide it, since it requires the acquisition of areas which are always outstanding in character and which are often more extensive than any local park. Hence, the provision of such recreation areas becomes a function of the state, in setting aside the state preserves and the state parks. Probably no other phase of the conservation plan meets so directly a vital need of the people, and no other is so generally popular.

More than sixty years ago, about 1870, the first state park in America was established by California on an area in the Yosemite Valley which later became a part of the Yosemite National Park. Only during the past fifteen years, how ever, has the idea of building up *systems* of state parks taken hold throughout the country. At the present time most of the states have *begun* the acquisition of their outstanding scenic areas for the use of their people, naming the tracts "state parks," "state forests," or "state reserves."

In the use of the several names more or less interchangeably, we see an illus tration of the confusion still existing with regard to the classification of sites owned by the states and falling within this general category. If we will consider the basic purposes of these areas and the requirements essential to the service which they have to give, we arrive at a dearer understanding of the whole field. The fundamental consideration is that the state has two objectives when it buys an unusually interesting tract. The objectives are. first, to *preserve* the character of the site, literally protecting it against any type of damage; and second, to make that tract available to the nature-hungry citizen in such a way that he may see and study and enjoy the place, without injuring it. This double purpose can be accomplished only by closely limiting the artificial devdopment of such areas, and by deliberately arranging to draw the big crowds to those units best suited to handle them, thereby protecting the areas which would be injured for the people' s own use by throngs stampeding through the woods and meadows.

Now this description is not like the city park, the metropolitan park or the county park, with their intensive provision for active recreation. Nevertheless, we find emerging more and more powerfully all over the country, the pressure for additional *facilities* in state recreation areas. Boating and swimming equipment for lakes and rivers, swimming pools, inns, cabins, winter sports equipment, and so on are being demanded in state parks everywhere. The custodian' s records

show a constant demand for these things in the Iowa state parks. In some states the tendency is for *every* state-owned tract of this general type to be highly developed for crowds of active holiday people. But here arises a conflict, for the passive enjoyment of nature's unspoiled beauty is necessarily injured (as is the natural beauty itself) by too much artificial development and too many people. Hence there have come to be two main types of project in this field. In one. the primary one. the state undertakes to literally *preserve* the sites of unique beauty and interest as nearly as possible in their natural condition. In the other, the state undertakes to introduce facilities for certain appropriate types of more active out-door recreation, and a section of the area takes on more the character of the park, but still in a somewhat different sense from the use of the word park for city and county parks. For Iowa, the two functions can be combined in several of the areas, but a larger number are distinctly of the preserve type. Accordingly, where the purpose is *mainly* to preserve the interest and beauty of the site with less intensive use, we are designating the area as a State Preserve; and where the park characteristic, that is. the more intensive use, predominates, or *where the two are combined,* we are designating the area as a State Park. Additional practical reasons for this distinction between the State Preserve and the State Park will appear further along in this discussion.

For Iowa, the state park program got its start in 1917 when the Board of Conservation was organized, and in 1918 the Fish and Game Department deeded to that Board the nucleus of a tract of 1.300 acres in Delaware county. This site, called Backbone State Park, had been studied and advocated by Macbride, Pammel and others and it is today the largest and one of the most interesting of the Iowa parks. Since the beginning of the movement Iowa has been among the leaders. The first National Conference on State Parks was held here. During the past fourteen years thirty-nine sites have been taken over by the Board and designated as state parks. Three smaller tracts of the sanctuary type have been given the name preserve. The total area of these forty-two sites comes to about 8,200 acres. They range in size from two and a half acres to 1,300 acres.

The accompanying chart illustrates Iowa's rank in state park acreage among several of the more active states. These comparative data are, however, not conclusive. Both in Iowa and elsewhere many sites have been classified as state parks which are essentially preserves, forests, game refuges, etc., and hence the comparative figures are somewhat misleading. Also, it must not be forgotten that some states can acquire state park lands at costs ranging from nothing at all to a few dollars per acre, while in Iowa all land is relatively expensive, which necessarily limits the possibility of purchasing large areas. Furthermore, Iowa's parks, by virtue of the relatively even distribution of settlement over the state, serve close-by populations in the main, contrasting with the more remote waste-land or mountain land state parks in other parts of the country. The parks in Iowa generally serve regions, one to each park, even though the more important ones also draw visitors from all sections of the state and from outside its borders. Finally. Iowa has little tourist business, and the investment in state parks must be largely justified on the basis of their service to the citizens of this common-

PLATE XLII — LOOKING FOR A STATE PRESERVE — Courtesy J N. Darlint

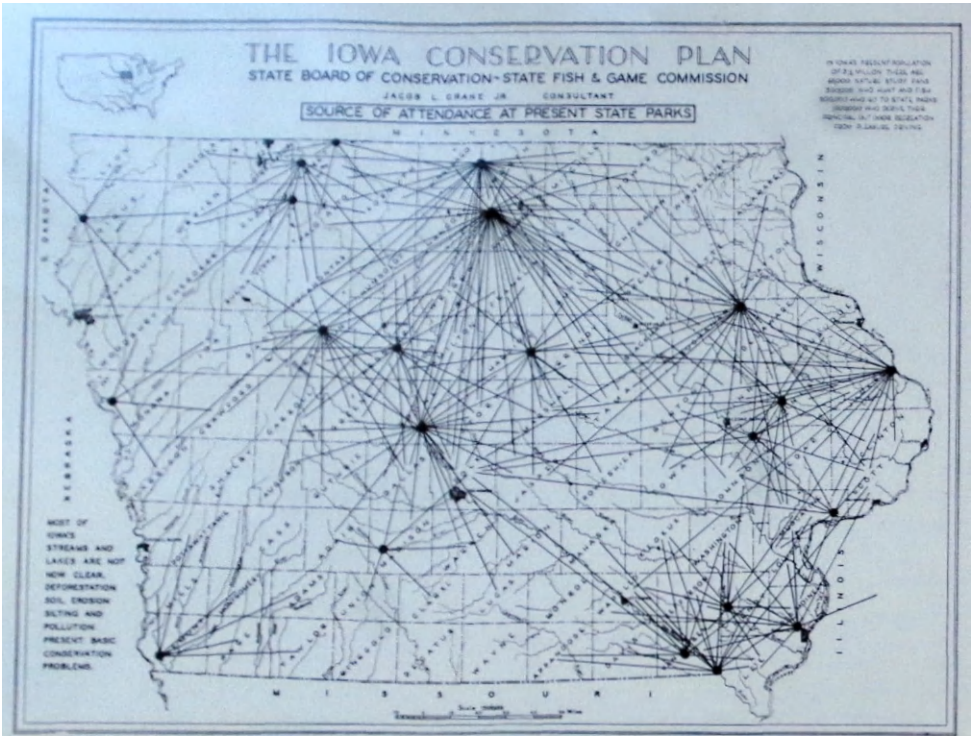


PLATE XLIII SHOWING ONLY THOSE PARKS ON WHICH DATA IS AVAILABLE. SEVERAL DRAW PEOPLE FROM OUTSIDE THE STATE

wealth, to the home-folks of Iowa. The chart of comparative acreages means less than it might seem to imply, and the fact is that Iowa's state park system ranks now among the first when measured in terms of money well spent to meet the state's particular requirements.

Few governmental agencies have produced so large a dollar's worth for its constituency as has the Board of Conservation in Iowa. Working with extremely meager funds, and handicapped in many ways, the Board has created a very creditable beginning on a state park system. As an indication of the usefulness and popularity of the state parks, they draw more than 2.000.000 visitors a year. Eldora Pine Creek State Park alone draws 250.000 visitors a year. Ledges State Park. 200.000. and Backbone State Park. 150.000 visitors a year. And these are nearly all Iowa people.

As the highway system approaches completion and as the state park system is extended and developed we may confidently expect a *four-fold increase* in the total attendance, and there will be few Iowans indeed who will not make some use of the state preserves and state parks.

The physical improvement of the state parks has only begun, a situation arising partly out of the meagerness of available funds, and partly out of the

justifiable desire to preserve the *natural* attractiveness of the sites. Nearly all of the thirty-nine "state parks" provide picnic grounds as a matter of course, and thus far picnicking is the only major type of recreation available. Seven parks are equipped with lodges; only one has cottages and these are unsatisfactory left-overs from an earlier commercial development. In thirteen camping is permitted. Lake fishing is available in eight, boating in six. swimming in six. Seven have golf courses within or alongside the park areas. The incidental facilities for effectively using these recreational assets are in many instances far from satisfactory. There are, for example, no swimming or wading pools, no inns or cabint. and no winter sport shelters. The provision of big areas and their development for recreation purposes is a costly business in Iowa. *To make out of each of the present thirty-nine sites a full-fledged state park would, with elaborate artificial development, be too expensive, and it is entirely unnecessary.* In fact to do so would *destroy the value* of many of them.

After a year of study on the habits and desires of Iowa people and on the available resources for state parks and preserves, certain specifications have been established for selecting sites and for organizing a state park-and-preserve system in Iowa. First we will deal with the "state park" plan, not because they are

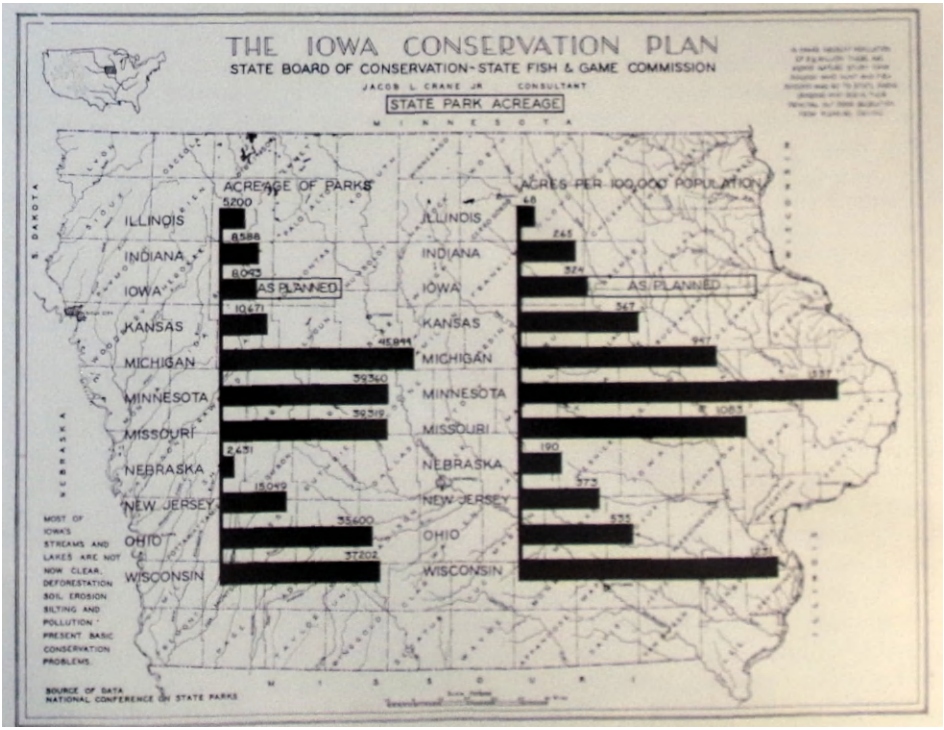


PLATE XLIV NOTE IOWA'S RANK AMONG THESE STATES

Old Mill Wild** Cat **Dan State Park

more important than the preserves, but be cause they involve cer tain geographical quali fications not essential to the preserve.

STATE PARKS

Every "state park" site must have "scenic quality;" it must have woods; it must have water; it must (except in unusual circumstances) have when completed not less than 500 acres of land and preferably not less than 1,000 acres; and, by definition, it must provide for certain forms of more active recreation in a setting of relatively unspoiled natural condi tions - on land or water, or on both. In many states it is possible to acquire much larger areas of cheap land for state parks but this is not ordinarily feasible in Iowa.

The types of recreation most commonly demanded and most appropriate in some contrast to the city or county park, are, in order, picnicking, swimming and boating, hiking, fishing, nature study, camping, playing, "vacationing" (inns and cabins), winter sports, and golf.

The types of natural scenery most appreciated are: wide views, as from the Mississippi and Missouri bluffs, "river-scapes" and "lake-scapes", rocky cliffs, and wild woodland.

To serve the recreational needs of Iowa's people in state parks, they should be spaced not more than approximately eighty miles apart in each direction, in-so-far as it is possible to find sites qualified for state park purposes in that pattern of distribution over the state. They *may* be placed at closer intervals to include outstanding opportunities, but otherwise *they need not be closer than the eighty mile spacing,* for that means an average driving distance of only abouf thirty-five miles from the homes to the state parks, and makes it possible for every family to visit some state park on any Sunday or holiday. And we must not forget that soon each work day may provide four or five hours of daylight leisure; and then the state parks will come in for much week-day use.

It is unnecessary then, to attempt to make thirty-nine fully developed state parks. The funds available for *state park* purposes must be concentrated and used on that number of sites which will qualify and which will adequately serve the state's requirements. Therefore, in making a plan of state parks, there arises

first of all the question: Which of the present sites shall be classed as state parks and developed as such, and which shall be classified and treated otherwise? As a part of the survey, the existing sites have been carefully studied, and the con clusions are shown on the accompanying map and in the following tabulation.

RECOMMENDED CLASSIFICATION OF PRESENT BOARD OF CONSERVATION SITES

(Where more than one classification is indicated, there are those alternatives, to be finally determined by later circumstances of land cost, etc.)

	State Preserve	State Park	State Sanctuary	County	City Park	District[1] or Park	Roadside*
Ambrose Call	X						
Backbone		X					
Barkley				s			
Bellevue		X					
Bixby	X						
Centerville						X	
Clark							X
Clear Lake	X						X
Dolliver						X	
Eagle Lake	X						
Elbert						X	
Eldora		X					
Farmington	X						
Flint Hills						*	
Fort Atkinson	X						
Fort Defiance	X					X	
Gitchie Manitou	X						
Keosauqua		X					
King (Springbrook)	X						
Ledges		X					
Lepley							X
Lewis 8s Clark	X					X	
Lost Island	X						
Maquoketa	*						
Oak Grove	x						
Oakland Mills	X						
Palisades		x					
Pammel		X					
Pilot Knob	X	X					
Pillsbury Point						X	
Rice Lake	X						
Rush Lake	X						
Silver Lake							X
Storm Lake	X						XII
Twin Lake	X						
Wall Lake							X
Wapsipinicon	X					X	
Waubonsie	X						
Woodman Hollow							
Woodt brush							

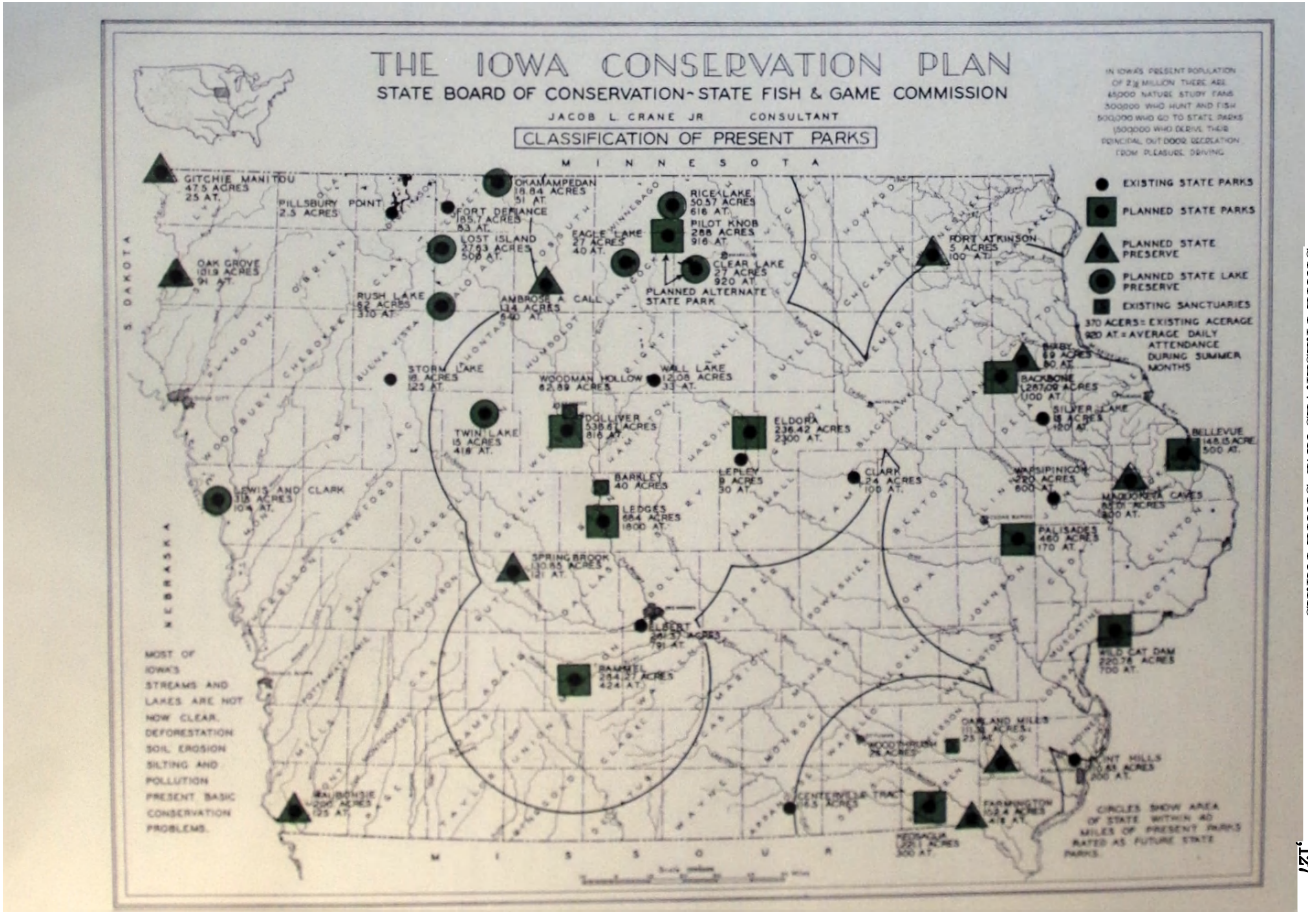
[1]With state co-operation in some cases.
[2]See succeeding chapter.
• For fishing or hunting access or for game production or protection.

Ten to twelve of the forty-two present state park and state preserve units are available by virtue of their character *and by their geographic location* as state parks, where, after enlargement in some cases, the more active recreation may be provided, usually in combination with the *preserve function.* Eighteen

to twenty of the present sites will find their greatest usefulness as "preserves." where the interest and beauty of natural features will be preserved for their in spirational and educational and re-creative value, and where the development already begun may continue - picnic grounds, trails, shelters, water supply and sanitary facilities, etc. Three of the present sites are essentially "sanctuaries." The other ten are destined logically for transfer, wholly or cooperatively, to local governmental agencies, cities and counties, or to the State Highway Department as part of the roadside park system. The map indicates the re-classification and the e ghty-mile areas of district service covered by each of the existing areas under consideration as state parks. These are Backbone, Bellevue, Dolliver, Eldora, Lacey-Keosauqua. Ledges. Palisades. Pammel, Pilot Knob and Wild Cat Den. Of the 2,000.000 visitors to forty-one state sites in 1931, over 1,000,000 were credited to these ten alone, which is an indication of their popularity for use by large crowds, and their eligibility as state parks.

Except for overlapping in some territory, or for difficulties in extension of area, or for the fact that in a few instances new areas will be cheaper and better than existing sites enlarged except for these circumstances, a number of other present tracts would logically be included among the state parks. Ambrose A. Call, Fort Defiance. Farmington. Oak Grove. Maquoketa, King (Springbrook), Wapsipinicon and Waubonsie all have fine qualities and under a different geo graphic distribution would qualify for enlargement and development as state parks, with the type of artificial improvement characterizing the state park under

A Shelter and Lodge



PLATS XLV - ONE **BASIS** FOR **A STATS** PARK **PLAN**

our classification. The little areas on state lakes are too small to serve successfully as recreational parks for big crowds of people. Most of these sites which are not recommended to be classed as state parks, even though some of them are now *over-crowded,* are, in the plan, clearly serving their highest purpose if they are kept as *preserves.* Their main function is to preserve some uniquely interesting or beautiful feature, the preservation of which is threatened by the very fact of mass use. The mass use must be diverted to the larger or more highly developed state parks *equipped to handle great crowds properly.*

The allocation of cost among the several divisions of the Plan bears heavily on this discussion. In the whole Board of Conservation program under the Plan, half of the entire budget is assigned to the development of the ten or twelve existing state parks and a few new ones. It is essentially a matter of ruthlessly paring down the number of state parks in line with the slogan, "serve the needs of the people within the least feasible cost." Otherwise, we would have a bigger total bill and no real state parks at all. *Nor would we have appropriate protection and use of the preserves.*

FUTURE STATE PARKS

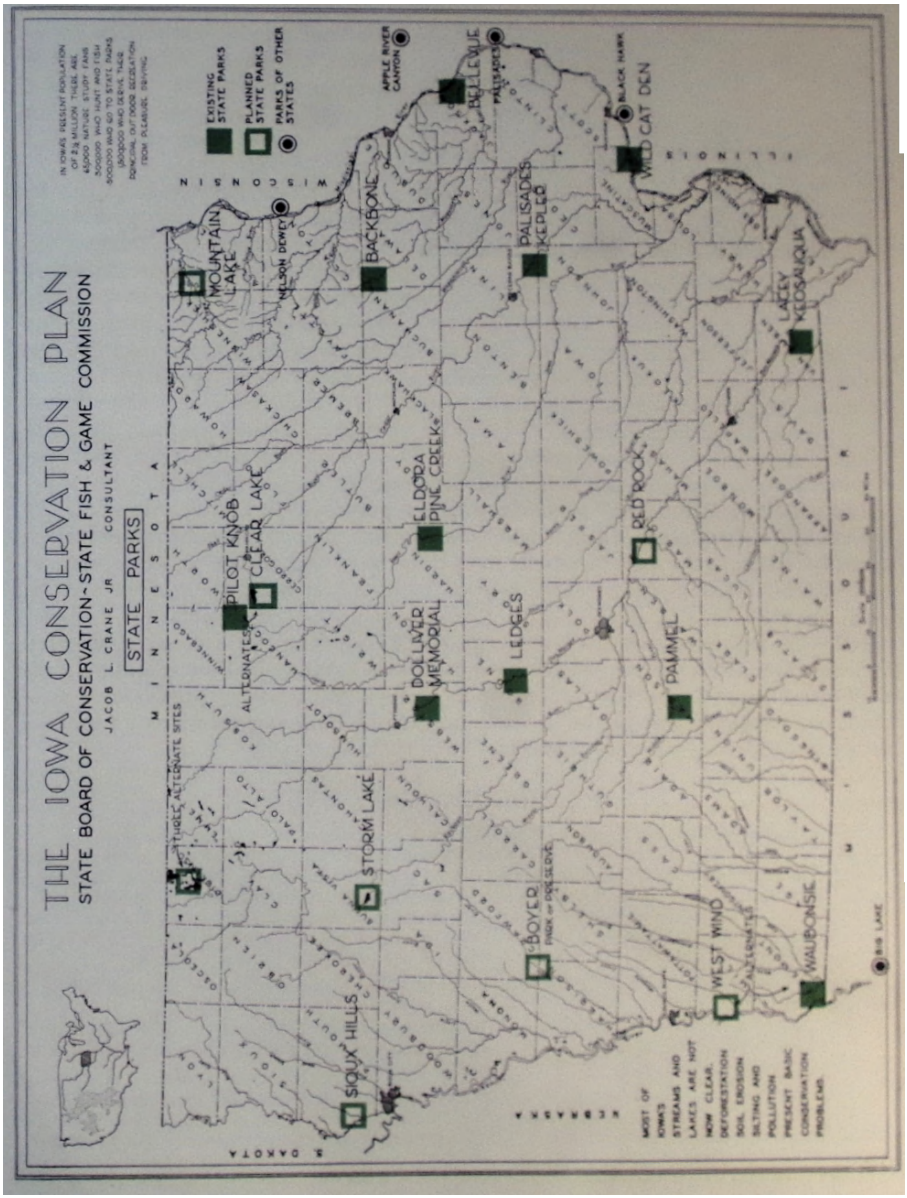
The recommended plan calls for about seven new state parks. They are selected in such a way as to give a good geographic distribution, covering the entire state on the eighty-mile basis (a forty-mile radius from each one), except in those few small strips which lie where they are well served by preserves or artificial lakes. They utilize some of the best large-scale scenic possibilities remaining in the state. They recognize the types of recreation most in demand. Except in two or three very special cases, they are placed where sufficient area can be secured at low cost to offer wild woodland surroundings as the setting for the more intensive recreation uses. *In each of these seven it is possible to choose among two or three alternatives of the same general character, so that no one owner can hold his price too high.*

The cost of building up this fine state park system over the next twenty-five years will run approximately as follows:*

	Land Purchase	*Development*
Enlargement of existing State Parks.....	$195,000	$555,000
New State Parks	390.000	670,000
	$585,000	$1,225,000
Grand Total.....		$1,810,000

It is not possible to foresee with precision either the cost of land or the cost of development, but the above figures represent an estimate at present prices, and the important thing is that the total is a very reasonable one for this state. The items of development named in the following descriptions of the state parks are

* The operation costs should be carried in the main by fees for the special services, such as supervised parking, concessions, etc. Admission fees are also a possibility.



STATE PARKS ARE PRESERVES PLUS ADDITIONAL RECREATION FACILITIES

Wild Hills Along the Missouri River. Waubonsie State Preserve

only suggestive. The final selection of the elements to be introduced into each state park must be left for the future. Meanwhile, a tentative development plan for each park has been made up as a general guide.

Certain special points may be mentioned here. It is essential that the scenic and recreational value of each site be protected by control of a large enough area. For example, where a park lies on one side of a river, it is important that means be provided for controlling the opposite side against cutting of the timber and against commercial enterprises. Further, it is important that the state preserve and state park properties (with their heavy investment of public funds) be protected against damage by commercial enterprises around them, particularly road-houses, etc., near their entrances. "Zoning" authority is here required, as suggested in Chapter XIV. Wherever "zoo or museum" is mentioned, it is proposed that only animal life or Indian life indigenous to that locality be shown. One of the most interesting types of museum is that in which native animals and plants are exhibited in their characteristic setting the type of ground, the kind of house or shelter, principal food, etc.

In the estimates and tabulations it is not forgotten that among state park facilities the first requirements are for a pure water supply and for adequate sanitary conveniences. In many of the state parks it is planned to provide nature-study trails in addition to the usual hiking trails, both being separate from the bridle trails, if the latter are provided.

DESCRIPTION OF STATE PARKS

Backbone — Delaware County. Present area 1,279 acres.

One of the most popular state parks: attendance in 1931, 150,000. Located in a wooded valley near clean head-waters of the Maquoketa river, with spectacular rock ridge, "the back bone;" wooded hills, trout hatchery, fine springs, caves, trout stream, picnic area, outdoor auditorium. deer range and custodian's house. Development recommended to include artificial trout lake, boating, swimming, wading, playfield, hiking trails and nature-study trails, bridle paths, winter sports, shelter, inn, cabins, museum or zoo, and possibly a golf course.

Bellevue — Jackson County. Present area 148 acres, to be enlarged to 300 acres, if land costs are reasonable.

Situated at the top of 600 foot bluffs, commanding magnificent view of the Mississippi river; fine upland woods. Development recommended: swimming and wading pools, play field, trails, camping grounds, shelters, museum or zoo, inn and cabins.

Dollivet Memorial — Webster County. Present area 526 acres; may be enlarged.

On the west bank of the Des Moines river with fine woods, rock walls, unique geologic formations, springs, rich plant life, trails, lodge, picnic grounds, camping ground, pike nursery pond, custodian's house.

Development: Swimming and wading pool, trails, additional shelters and cabins.

Eldora Pine Creek Hardin County. Present area 236 acres; may be enlarged

Lovely 70 acre lake surrounded by rough, wooded hills, with good provision for fishing, boating, swimming, golf course, trails and custodian' s house. Most intensively used state park, attendance 1931, 250,000.

Development: Trails and perhaps bridal paths, winter sports, camping grounds, inn, cabins and shelters, museum or zoo.

Lacey-Keosauqua — Van Buren County. Area 1,222 acres.

Rough and picturesque, wild wooded hills, good river front; now equipped with picnic and play areas, golf course, trails, camping grounds, shelter house, custodian's house.

Development: Swimming and wading, artificial lake, fishing, boating, bridle paths, inn and cabins. Possibly a summer-time Indian village.

Ledges — Boone County. Present area 684 acres; may be enlarged.

Heavily wooded and remarkably wild river valley park, drawing many thousands of visitors: shelters, zoo and custodian' s lodge.

Development: Swimming and wading pool, play fields, bridle paths, winter sports, inn and cabins, perhaps a small artificial lake.

Palisades - Linn County. Present area 460 acres; may be enlarged.

Named for the unusually fine rock ledges along the Cedar river; rugged and heavily tim bered area; used as summer resort before state acquisition. Now equipped with picnic grounds, trails, old shelter house, few cottages and custodian' s house.

Development: Swimming and wading pool, play fields, winter sports, camping grounds, inn and cabins, shelters, museum or zoo, and golf course.

Pammel — Madison County. Present area 284 acres; may be enlarged.

The Middle river winding in and out of the park, doubles back on itself around an abrupt limestone ridge, through which the road passes in a tunnel originally built for water power put poses; wooded ridges and hillsides and meandering streams are beautifully balanced in this area now equipped with picnic grounds, trails, shelter and custodian' s house.

Development: Artificial lake, boating, swimming, play field, camping ground, cabins and shelters.

Pilot Knob Hancock County. Present area 371 acres.

A great group of glacial hills rising to a point 300 feet above the surrounding country[1]; wild and heavily wooded; extraordinarily fine views; high up in park is Dead Man' s Lake, with American lotus. Equipped with picnic grounds, trails and shelter.

Development: Play fields, winter sports, camping grounds, inn and cabins, custodian's house, and museum or zoo.

If a state recreation park is developed on Clear Lake, as discussed under Proposed State Parks, Pilot Knob would probably not be so highly developed and would be better classed as a state preserve.

Wild Cat Den - Muscatine County. Present area 220 acres; may be enlarged. Seventy acres of additional land have been willed to the state.

Flowering rocky cliffs and deep gorges; wooded hills and wide meadows; winding Pine Creek; mill and dam 100 years old. Equipped with picnic grounds, foot trails and custodian's house.

Development: Restoration of old dam. some fishing, swimming, play fields, camping grounds, inn, cabins and shelters.

oxide Recreation Building ■ Courtesy Weet- Chester County. N. Y. hark Commission

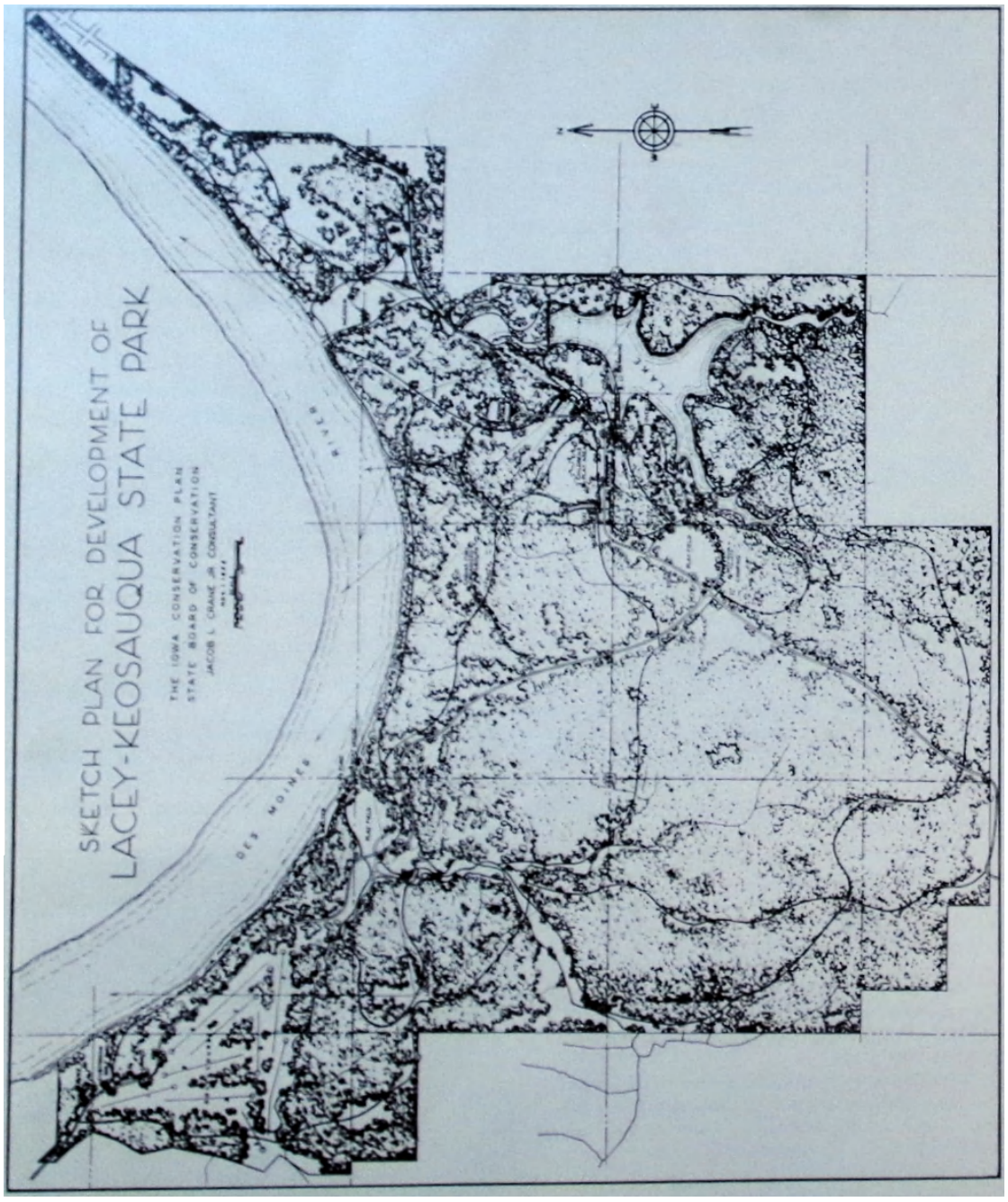


PLATE XLVII — A TYPICAL LARGE STATE PARK

FUTURE STATE PARKS

Boyer State Park Crawford or Harrison County. Area 800 acres, more or lew

The middle southwestern section of the state must have a state park. The best sites within the geographic territory to be served are along the Boyer river in southwest Crawford and north cast Harrison counties. In any one of several locations 800 to 1,000 acres with beautifully wooded uplands can be secured with fine wide views and with good existing or easily unproved highway access.

The development may include reforestation, a beautiful little lake, fishing, swimming, picnic and play areas, trails, camping grounds, shelters and custodian's house.

Clear Lake - Cerro Gordo County. In the centra! northern part of the state the greatest natural summer recreation asset is Clear Lake, which is one of the finest lakes in the stale So much of the shore property has been taken up by the town and by cottages and commercial enterprises that not much remains available for public acquisition. However, on the north shore at the western end of the main body of the lake there is still a wooded peninsula ca r 1 Macintosh's Point, which offers a possible nucleus for a state park. If this point and enough back land could be purchased at reasonable prices, a fine recreational state park could be dc veloped here. The whole question hinges on the land cost. If this proves feasible (although no definite hope is set up that it is feasible) the state could here produce a park with a long shore line, wooded picnic and camping groves, an inn and cabins, piers, boating and swimming facilities, and perhaps a golf course and bridle paths. It would constitute a carefully planned, carefully developed.and controlled state summer resort. In that event Pilot Knob would logi cally be maintained in its natural character as a great preserve.

Mountain Lake State Park Allamakee County. Proposed area 1,500 acres.

Along a section of the Upper Iowa river for a distance of 10 miles or more lies the mwi *interesting rugged country in the interior of Iowa.* Here a possible future water power development would make a lake fifteen miles long nestled among the abrupt steep hills which rise *500 feet* above the river. Northeast Iowa has more than its share of scenic beauty and of conservation projects, nevertheless this opportunity cannot be overlooked, and geographically (see map) this location is not inappropriate. It is difficult to choose among the several finest park sites in Iowa, but this one may turn out to be the finest of all. The precise site can be chosen from many more-or-less equally good possibilities, but the development of the tract requires close cooperation between the state and the power company. However, a park here will be justified even if no water power plant is built.

Development: Water power lake, fishing, boating, swimming, picnic areas and play fields, winter sports, trails, camping grounds, inn and cabins, shelters and custodian's house.

Red Rock State Park Marion County. Southeast of Dcs Moines lies one of the most picturesque as well as one of the most historic points along the entire length of the Dcs Moines river. On the northeast side of the river red sandstone cliffs, unique in Iowa, rise above a wooded grove. At the top of the cliffs, woodlands and meadows offer lovely views and fine recreation areas. Here treaties were signed between the Indians and the white men. and the boundary was set between their respective territories. The site is now used as a picnic ground for which ad mission is charged by the owner. Opposite, across the river, fine wooded hills rise above the deep ravines with extraordinarily rich vegetation, and with sand blows and sand dunes on lop. Both areas, (not necessarily connected) a total of 900 acres, would make an excellent state park with one side developed for the more intensive recreation uses, and the other more in the nature of a preserve. If land values are by any chance held too high, there arc two almost equally good opportunities farther south, all within the range of the proper geographic location, to serve a big territory needing a state park.

Development: Swimming and wading pools, picnic grounds and play fields, bridle paths, trails, camping grounds, inn and cabins, shelter, zoo and custodian's house.

Sioux Hills State Park Plymouth County. Along the Big Sioux river in Plymouth County, the great red and brown loess hills offer a rare opportunity for a state park, with better geographic location and far more interesting values than the sites now operated in that section by the Board of Conservation. The tops of these fantastically broken hills are covered only

The First Purpose is to Preserve Courtesy J. N. Darling

with brightly colored prairie grasses and flowers, and in the valleys and ravines they are heavily wooded — one of the most uniquely picturesque landscapes and broad river views in the west. Here 1,600 acres of land nearly worthless for agriculture can be selected almost anywhere within a range of many thousands of acres.

Development: Swimming and wading pool, picnic and play areas, bridle paths, winter sports, trails, camping grounds, inn and cabins, shelter, museum and custodian's house.

Okoboji District State Park: No state park system in Iowa would be complete without a state park in the Okoboji-Spirit Lake district. These lakes are the finest in the state, and all told, they are the most valuable active outdoor recreational assets of the state. Thus far the Board of Conservation has no frontage or back land valuable for general recreational purposes anywhere on this wonderful chain of lakes.

On the several lakes, but mainly on Spirit and West Okoboji, there are at least three and perhaps four or five alternative possibilities for acquiring shore lines and back lands for a state park. Since the entire lake on which such a park would front is available for recreational purposes and since land costs in some of the situations may be high, the land area to be taken need not exceed 300 to 500 acres. A major state park in this district would be one of the most popular in the whole system, and in the purchase of land and development a larger sum would be justifiable than perhaps for any of the other state parks.

Development: Boating, swimming and wading, picnic and play fields, golf (if not already available), winter sports, trails, camping grounds, inn and cabins, shelters, piers and custodian's house.

Storm Lake State Park: The Storm Lake situation presents many difficulties, both in restoring the lake itself to a decent condition (See Chapter VI) and in securing a developed state park.

The present so-called state park at the east end of the lake is crowded in between a commercial beach development and a golf course.

The proposals for the state park at Storm Lake are not yet well enough defined to warrant setting them down here. However, the whole middle northwest section of Iowa is dependent upon Storm Lake as its principal (almost its only) recreational asset, and the Plan cannot fail to recognise Storm Lake as the point for some type of state park development, if it can be worked

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State Parka Must Be Equipped tor Large Crowds

out economically. The project, however, must be considered contingent upon the solution of the lake problem* themselves sewage, algae, etc.

We$t Wind State *Park:* South of Council Bluffs along the great tumbled hills bordering the Missouri river, lie several magnificent state park sites, Further south, in Fremont county, 200 acres are now owned by the Board of Conservation and the area is called Waubonsie State Park. For state park purposes this area should be increased, but there are two factors scoring againit the extension of Waubonsie. The land owners adjacent seem to place much too high a value on the land to justify state purchase, and second, this site is so far removed to the southwest as to be of less service in a proper geographic distribution than sites farther north along the river would be. Hence, there are for this West Wind State Park item at least three ailcs native possibilities — the extension of Waubonsie, or the acquisition of lands in one or the other of the two fine areas farther north. All things considered, principally the fact that 2.000 acres can be taken at low cost anywhere within the range of 10,000 acres of similar hills, the upshot may well be that a new state park appropriately named West Wind State Park will be under taken. Whatever the outcome, these very beautiful hills and wooded ravines may be developed to include swimming and wading pools, picnic grounds, play fields, trails, camping grounds, inn and cabins, shelter, zoo and custodian' s house.

To fulfill the great purposes assigned to the state parks, the beauty and in terest of their landscape must be very carefully protected even though the recrea tion elements are introduced. In fact the natural quality of the site should be utilized as the essential *setting* for the closely limited area given over to recreation, thereby greatly enhancing the state park value. The state park is situated in a *state preserve,* and in reality the area is both state park and state preserve. This is a basic consideration in all cases except perhaps at the state parks on lakes: Okoboji or Spirit, Storm, Clear and Eldora, and even in those cases it may be possible to establish the preserve part as distinct from the park part of the area.

THE STATE PRESERVES

To repeat, the State Preserve is distinguished from the State Park in the recommended Conservation Plan as follows: The state park should offer recrea tion facilities for great crowds of visitors in such a way as not to seriously injure the natural character of the site, at least wherever that natural character is of great value, as it certainly is in nearly all the state parks. The state preserve, on the other hand, has its first purpose in literally preserving a point of special interest or beauty for public use in a less intensive way. The preserve is justified wherever an *outstanding* feature may be saved at reasonable cost and opened to public use. The preserve may be large or small in area, it may or may not be highly developed, and it may be placed wherever the features are found, more or less regardless of geographic distribution, although the more evenly they arc spread over the state the better, and also the more often they fit in between other types of project like state parks and state artificial lakes, the better. All told, the pro-

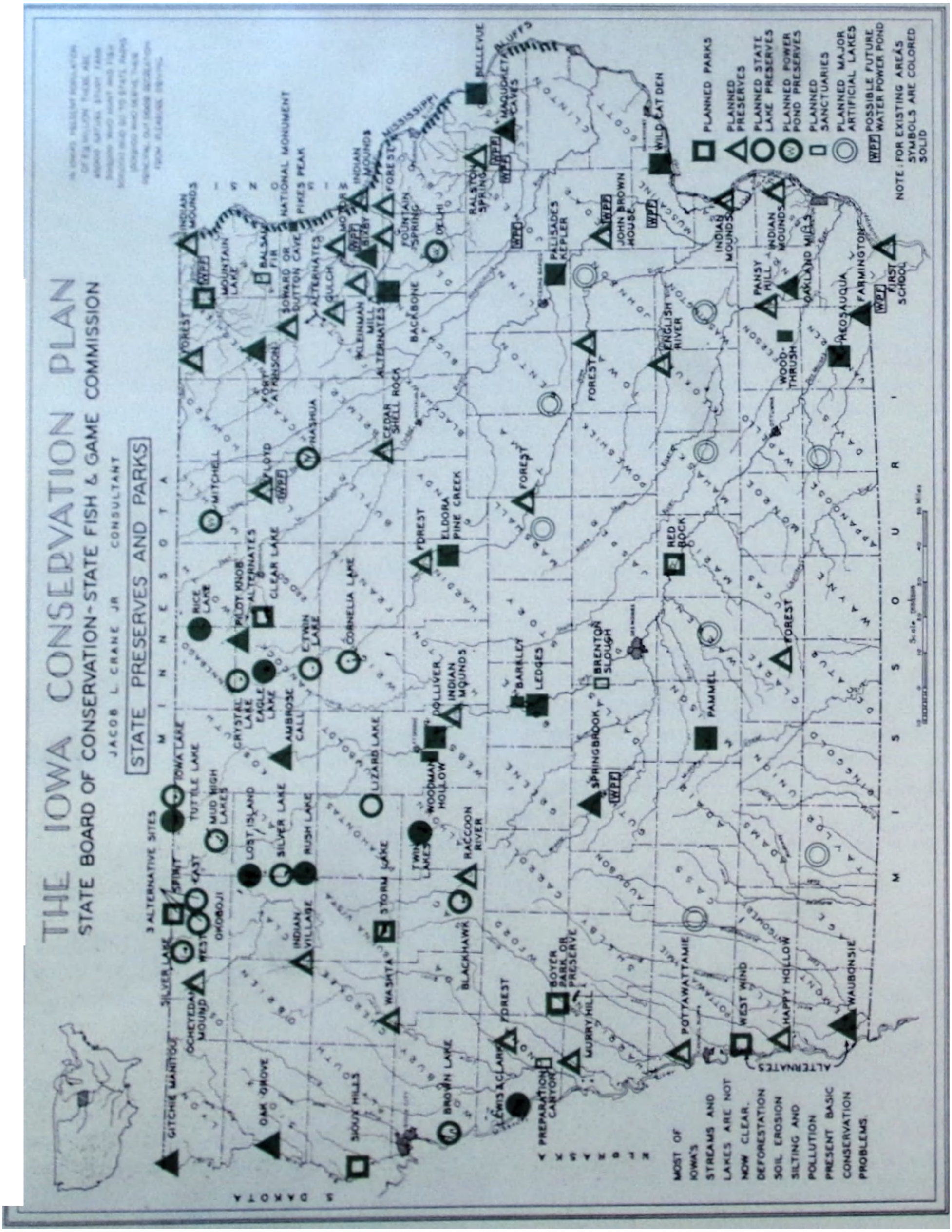


PLATE XLVIII -THE PRESERVES INCLUDE ONLY POINTS OF OUTSTANDING INTEREST—SCENIC HISTORIC—SCIENTIFIC FOREST

gram of preserves must not cost more than can be reasonably put out for them. They generally require land purchase, access and parking arrangements, picnic grounds, shelters, water for drinking, and comfort facilities. Generally, they need not provide other recreational elements, although fishing, swimming, boat ing, skating, etc., may appropriately be provided where the necessary water is available. The State Preserves, as recommended, will be quite similar to the present State Parks.

The whole program of preserves includes seventy-five to eighty items. They are subdivided into several types:

Historic Preserves, like Fort Atkinson, which will save typical points of great interest in the history of Iowa points which cannot be included in other projects. Recommended for public visiting, but not to be otherwise developed. Some dozens of additional historic points are included in the state parks, in other preserves, or in other protected private or public ownership (see state highway map). A corollary project to be set in motion by the Board of Conservation is to get markers placed along the roads pointing the way to the important historic points and also to establish descriptive plates, etc., at the sites themselves.

Scientific Preserves. Unique geologic formations and Indian mounds, out side of the state parks. And at least one Prairie Preserve.

Forest Preserves. The seven outstanding woodland tracts of the state not lying in state parks and justifying state ownership. Open for limited picnicking and walking but not otherwise developed.

Scenic Preserves. The scenic preserve resembles the state park most closely, in that its purpose is to save and make available for outdoor public recreation some sixteen areas of unusual scenic beauty. But they are generally smaller in area and should not be so highly developed, the principal cost being the land purchase. They are spaced between state parks, but are not intended to draw large crowds, being of more distinctly local and special service more secluded and quiet.

Preserves on na tural lakes. A number of existing so-called state parks on the shores of natural lakes are valuable mainly to pre serve public access to the lakes and to pre serve the value of the "lake-scape" views. To meet the urgent de mand for points of ac cess to other lakes, ten additional preserves of this type are included

Stale Parks andPreeenre otter Finest Camp Ground*!*

John Brown's House

in the plan. Each of them is to provide parking space and picnic grounds; and in some cases shelters, water supply, piers, etc., are to be provided. For the *big crowds* which crave full use of lake recreation, two or three highly developed *state parks* are recommended in the territory where they are most needed, one at Storm Lake and one in the Okoboji district, and perhaps a third at Clear Lake.

Power Pond Preserves. Three existing water power ponds offer opportunities for preserves which would be similar in character and use to those on natural lakes. In the future certain water power projects may offer similar opportunities, and each application for a permit to erect a hydro-electric plant should be studied with this in view.

Artificial Lake Preserves. Around each of the nine first artificial lakes recommended to be built elsewhere than in state preserves and parks, the land will be valuable for general recreation. While these lakes are first of all projects to improve fishing and hence are included in the Fish Conservation schedule, their value will be great for picnicking, camping, boating, swimming, and nature study, and in a *few* cases for inns and cottages. Hence, they are inevitably destined to development for these uses. Here these lake projects overlap into the field of the Board of Conservation, which by experience and by logical division of function, is the proper agency to handle this whole phase of supplying recreational facilities in southern Iowa. Some of these lakes are therefore included among the preserves. for development and administration by the Board of Conservation, or the corresponding Division in a Department of Conservation. This program is based on the premise that the state-owned land area around the lakes will be used for regulated public recreation only and that no uncontrolled private commercial projects and no individual private cottages will be authorized within the bounds of the state property. The plan and policy drafted and recommended for the Davis County lake are a guide on these matters.

THE STATE PRESERVES

A - Historic Preserves'

Fort Atkinson Winneshiek County. Existing Preserve. Now owned and administered through the Board of Conservation.

John Brown's House Cedar County. Recommended. This should be acquired, moved from behind the farm house, and restored. It is a most interesting historic monument and also beautiful architecturally.

Iowa's First School House Lee County. A site near the first school house in Iowa (1830, now under water), is owned by the Board of Conservation. A reproduction of that first

"The classifications are not sharply defined, but they help to group and balance the various types.

school house would create an interesting historic feature. It could be placed on or near the point where the D. A. R. marker is now set. The old log school served one of the earliest settle ments in Iowa, and could be appropriately used as a museum, etc.

Fountain Spring Mill Delaware County. Recommended (see below). Of the hur. dreds of old water mills once operating in Iowa, the Fountain Spring Mill was one of the earliest (1857), and it is one of the most picturesque and interesting of those still standing It can now be acquired, restored to some degree, and used for limited public visiting and picnicking, and as a museum. A beautiful place. There are two other fine old mills in the same territory, Kleinman' s Mill and Motor, which may be considered alternates or which may be eligible for acquisition.

B — Scientific Preserves

Bixby Preserve — Clayton County. Existing. The Board of Conservation now owns sixty-nine acres with springs, rocky cliffs, and most interesting ice caves in which ice forms in the summer time. It is now provided with picnic area about an old log cabin used as a shelter. Limited further development is planned. A trout fishing pond is possible here.

Gitchie Manitou Preserve — Lyon County. Existing. In the extreme northwestern comer of the state the oldest geographical formation in Iowa appears on the surface in the form of sioux quartzite rocks. The state now owns forty-seven and a half acres and the area is used for picnics and scientific study. Within the area lies a little pool with red rock walls around it. Some improvement and development is proposed here, but the area remains essentially a scicn tific preserve.

Maquoketa Caves Preserve — Jackson County. Existing. The so-called Maquoketa Caves State Park now draws thousands of visitors every summer. In fact it draws so many that the essential value of the site, dependent almost entirely upon the caves, is in a good way to be destroyed. Hence, the park must be treated as a "Preserve" for the purpose of saving its scientific and recreational value. It is an extremely fine site for general public visiting, with its caverns and passages, natural bridge, high cliffs, underground streams, etc. Shelters and camp ing grounds may be provided to improve its use as a recreational and scientific preserve.

Indian Mounds — Recommended. Outside of the Indian mounds contemplated within a National monument near McGregor, five other groups of mounds are recommended in the Plan for acquisition as scientific preserves. They constitute one of Iowa's richest scientific and historic assets. The cost of acquisition is relatively nominal and their value ranks high per dollar invested. These groups are in Des Moines, Louisa. Clayton, Allamakee and Webster counties. Another might be added, name ly, the group just east of the Palisades State Park.

Prairie Preserve — Recommended. Along the railroad rights-of-way, and here and there in small patches throughout the state, unbroken virgin prairie sod is still to be found. Some of these will be saved be cause they lie within protected areas, or simply because the ground cannot be used for farm purposes. But somewhere in Iowa a large enough original tract of prairie vegetation should be secured in or der to save, under control of the state, the characteristic landscape and wild flowers and wild life of the native prairies. Several tracts ranging from forty to three hundred acres in area have been found by the sur vey. The Conservation Plan includes a

Upper-Iowa River

The People of Iowa Own Seventy Lakes

Prairie Preserve which will be one of the remaining original areas, or which may be produced by purchase of semi-waste land and bringing it back to prairie condition in a few years' time. On a large enough Prairie Preserve a few buffalo could be kept!

Ocheyedan Mound — Osceola County. Recommended. A glacial hill of scientific interest, offering great views over the country.

Soward Cave — Fayette County. Recommended. If available at a reasonable cost this unusual and beautiful formation would qualify for acquisition. There are two alternate sites of equal interest and beauty.

FOREST PRESERVES

Under the classification of woodland conservation measures (Chapter VII). the forest preserve is the only one calling for purchases of woodlands by the state. Seven outstanding areas of timber have been found in the survey and are recommended for acquisition as State Forest Preserves, and for development only to furnish parking and picnic spaces, trails and sanitary facilities. Each of these areas is so located in its relation to the state parks, etc., as to have some recreational value, and each one lies in a wooded district more or less unique in Iowa. The areas proposed in these seven sites range from 300 to 1.000 acres. They would have some value to the state (and might be self-supporting) from scientific cutting and selling of timber. But their great value and justification is in the woodland conservation factors (see Chapter VII), and in their preservation of unique and outstanding forest plants and forest scenery.

SCENIC PRESERVES

Ambrose A. Call Preserve Kossuth County. Existing. This existing "State Park" would qualify for further extensive development as a state park if it were not for the necessity of concentrating available funds on the relatively few major state park projects and the further necessity of avoiding over-laps in the geographic territory served by state parks. Hence, Ambrose A. Call is logically a State Preserve differing from a state park only in its size and degree of development. Some further improvements are recommended.

Farmington State Preserve — Van Buren County. Existing. This existing site of one hundred two acres includes a lovely fifty acre lake and is now more popular than Lacey-Keosauqua State Park. However, it is too small for full-fledged state park development and it lies too close to Lacey-Keosauqua. which constitutes the logical big state park project for this section of the state. As a State Preserve, Farmington justifies some further development including facilities for swimming, boating, play fields, trails and camping grounds.

Oak Grove Preserve Sioux County. Existing. One hundred and two acres are now owned by the Board of Conservation; an interesting area with woods, and a remnant of prairie vegetation. Not susceptible of enlargement as a state park, nor well located geographically. Qualifies as a first-class scenic preserve and justifies some development for camping, etc.

Oakland Mills Preserve — Henry County. Existing. Formerly classed as a state park. Contains 111 acres. An unusually beautiful wooded hillside, but too small and not properly situated geographically for a major state park As a preserve its essential value will be less damaged; and only limited improvement is desirable.

Springbrook Preserve (King State Park) Guthrie County. Existing. Contain* 113 acres, renamed and reclassified. Like Oakland Mills, this site it of great scenic value, but it not geographically placed to call for major state park consideration. It will, however, have high recreational value as a preserve. Two clear spring-fed brooks offer one of the best opportunities in the state for making a trout fishing pond, and hence the program includes one or two dams and small lakes. Other development: swimming, play fields, camping, shelters and custodian's house.

Waubonsie Preserve — Fremont County. Existing. As discussed above in the section on State Parks, if a new state park is developed farther north. Waubonsie would become a State Preserve, retaining all its present values but not justified for enlargement and extensive im provement.

NEW SCENIC PRESERVES

The following eleven additional scenic preserves widely distributed over the state are recommended for consideration. No one of them is at all essential to the success of the Conservation Plan, and hence if the owners hold the land prices too high in one or more places, they may be dropped, or other sites selected.

Cedar-Shellrock Preserve— Black Hawk County. Woods, rivers, fishing, boating, pic nicking, trails, camping and shelter.

Coon River Preserve — Sac County. Woods, hills, river, springs, fishing, picnicking, trails, camping and shelter.

English River Preserve — Keokuk County. Woods, hills, picnicking, trails, camping, shelters and perhaps a small lake.

Floyd Preserve — Floyd County. Woods, river, springs, probably future power pond, fishing, boating, picnicking, trails, camping and shelters.

Happy Hollow Preserve Mills County. Fine woods, hills, ravines, picnicking, trails and camping.

Indian Village Preserve — O' Brien County. Site of old Indian village, historic and scenic. Wooded hills, river, fine views; fishing, picnicking, winter sports, trails, campir.g and shelter.

Murry Hill- Harrison County. High Missouri river bluffs, woods and fine views: pic nicking, camping and shelter.

Pansy Hill — Henry County. Well-known scenic spot, good woods, views, wild pansies, good opportunity for roadside tavern, picnicking and trails.

Pottawattamie Preserve Pottawat tamie County. Rough wooded hills north of Council Bluffs. Thousands of acres from among which an excellent preserve may be selected: precise location depending upon land costs and cooperation with city and county; preferably should not adjoin city park lands. Scenic road, trails and shelter.

Ralston Spring Jackson County. Wooded ravine, big spring, old mill, high botanic interest; scenic and historical.

Wash ta Preserve — Cherokee County Wooded valley; views over the Little Sioux river. Picnicking, shelter, trails and camping.

The Mississippi from McGregor Heights

A State Preserve Trail

STATE LAKE PRESERVES

Eight state owned tracts on natural lakes are eligible as state preserves and they are in most cases of great recreational value. In order to preserve that value, however, it is necessary that the big crowds be drawn to the major state parks, as above discussed, and that these small sites be used by limited numbers only. For this purpose, only minor improvements are justified. These eight are Clear Lake, Twin Lakes, Lost Island, Okamanpedan on Tuttle Lake, Rice Lake, Rush Lake, Eagle Lake, and Lewis and Clark on Blue Lake. Their greatest usefulness will be attained under this policy.

Similarly, thirteen additional preserves on natural lakes are included in the Plan. They are of great importance in furnishing public access to the lakes and for public recreation, and they justify improvement for swimming, boating, shelters, picnicking and sanitary facilities. They must be classed as preserves and treated as such in carrying out the Conservation Plan.

POWER POND PRESERVES

There are three existing water power lakes in this state on which small preserves would serve a very useful purpose in giving public access to these water areas and in supplying projects in territories not otherwise well served. The site on the Delhi water power pond ranks high, and the site on the Mitchell pond ranks with any of the smaller preserves in the state. The Nashua pond site is less attractive, but it lies at a strategic point geographically. None of these projects is essential in the Conservation Plan in case the land cannot be acquired reasonably, but if purchased they justify development for boating and swimming.

SANCTUARIES

Every game refuge is in effect a wild life sanctuary, as likewise are the state parks and state preserves. These elements of the Plan will provide a total of some 150 areas where birds and animals and plants will automatically find sanctuary. In addition, however, there are six tracts in the state which have unique value for this purpose and which are neither needed for nor suitable for public recreation generally. These should be accessible only to study groups.

Three existing Board of Conservation sites, formerly called preserves, fall naturally into this class:

Barkley Sanctuary
Woodman Hollow Sanctuary
Wood thrush Sanctuary

Three others are recommended for consideration:

Balsam Fir Sanctuary in Allamakee County
Preparation Canyon Sanctuary in Monona County
Brenton Slough Sanctuary in Polk County

The first two will save unique and valuable plants and trees and bird life and are essentially Board of Conservation projects. The last. Brenton Slough is a magnificent marsh-life sanctuary, with value also as a waterfowl and upland game nesting ground and refuge. Hence, it is recommended as a joint Fish and Game and Board of Conservation project.

The State Preserve and Sanctuary program, with its first purpose to save natural features of paramount value and its secondary purposes for recreation and nature study, seventy-five to eighty in all. will cost approximately:

For land purchases, extensions and new acquisition	$550,000
For development in both existing and new areas .	555.000
Total.....	$1,105,000

LAND AND DEVELOPMENT

State Lake Preserves, Total .,	$298,000
Historic Preserves, Total.....	26,000
Scientific Preserves, Total.....	84.000
Forest Preserves, Total	237.000
Scenic Preserves, Total	307,000
Power Pond Preserves, Total	42.000
Development, Artificial Lake Preserves. Total	95,000
Sanctuaries.....	16.000

If half of the preserves were developed as *state parka,* under their present misleading classification, the total preserve bill alone would run to $3,000,000, which would be out of proportion. A large part of the available funds *must* be put into a relatively few state parks, and smaller amounts into the preserves.

The total Board of Conservation program for the acquisition and develop ment of state parks, state preserves and sanctuaries, that is. the capital invest ment, will total approximately $3,000,000. The figures are based on present day prices but they are figured amply, with a considerable margin of safety. It is impossible to forecast future changes in costs. They may be more or less than here calculated. In either case, however, the economic status of the people will tend to rise or fall with prices, and the cost of the program will remain propor tionately the same, measured in terms of capacity to pay.

And the program is a modest one. Over the twenty-five year period it means an annual investment of only $120,000 a year, or five cents per capita per year the cost of one package of gum per year for each person, or a total family cost of one movie admission per year.

However, the development program cannot, in view of the insistent popular demand for more and better parks and preserves, be spread out over the whole twenty-five year period. That is not a long time for the completion of the program, but the people will not wait that long. It seems more sensible to figure on a fifteen year development period, at $200,000 per year.

This whole project should be carried out along the same line which the Board of Conservation has followed up to this time, namely calling on local support in the acquisition of sites and to some degree in the development. A general policy would dictate that twenty-five per cent of the cost (or fifty per cent of the land cost) should generally be provided locally in gifts, in subscription funds, and in labor and materials on construction.

While the state parks should generally be altogether under the control of the state (even though local or other assistance is given on land purchase), the pro gram of preserves offers an opportunity for cooperation between municipalities or counties and the state. Both on the management of those sites now owned by the Board of Conservation and classified as preserves or as local parks, and on the proposed preserves, it may be possible for a system of state aid to be set up, under which the local authorities or groups would take a certain initiative and assume certain responsibilities, and the state would cooperate with financial assistance and with technical aid on design and development. Such a program might tend to stimulate local action and enthusiasm and pride, and it might also serve to get under way earlier in the program some projects which would have to be long deferred if the state undertook the whole job from the beginning. Of course, the division of authority and responsibility would have to be clearly de fined. It is suggested that local groups which are eager to make a start on a cer tain Preserve project (or even on a State Park project) consider this method of approach and confer with the state agencies whenever a concrete proposition can be discussed. In Iowa the state has received comparatively little in the way of gifts of land or money. While much good has been accomplished by the funds and lands deeded or willed for a great variety of other public welfare purposes, it is difficult to imagine any better grant than land or money for a state park or a state preserve, both as a memorial and as a great public benefit. The plan here outlined will, it is hoped, serve to stimulate such grants. Surely Iowans are not less proud of their state nor less loyal to its fine development than are the citizens of other states.

As our day-by-day lives become more and more mechanized, further and further removed from the inspiration which only the beauty and grandeur of nature can give — year after year the value, in fact the necessity increases for saving for public use those finest remaining sites where the various and magnificent work of natural forces can be seen at leisure. For all the "home folks" of Iowa the state preserve and the state park offer the best opportunity for the over wrought mind to re-capture its serenity and dignity and spiritual power. The pressure of demand for this program demonstrates the wide realization that the destiny of the state, as a good place to live, is in a real sense involved in the plan for state preserves and state parks.

COUNTY AND CITY PARKS

The state cannot undertake to provide all the outdoor recreation facilities. In fact, it should only *supplement* the local park systems, taking over projects which have a state-wide or regional significance and which the local authorities cannot be expected to handle. Eventually, the great bulk of the parks for day-by-day use, will be provided by other than state action by the counties and cities and park districts.

In reclassifying the present state park properties, a number of them are recommended for transfer to local agencies, to be administered wholly by the latter or jointly by them and the State Board of Conservation, under a state-aid arrangement. Furthermore, the conservation survey has discovered a good many points which are worthy of consideration for local parks. A map shown here indicates the location of those sites as well as the known present city and county parks. Details can be supplied on any of these sites.

For the acquisition and development of local parks one item of legislation is very much needed. Municipalities now have the necessary authority, but counties have not. Nor-has an area of any size larger than the municipality authority at present to carry out park development projects. The simplest and probably most satisfactory permissive legislation would be a statute authorizing organization of park districts of any size whatever, along the lines of the Illinois park district law.

Another excellent suggestion for stimulating and aiding local park work, is that a State Conference on Parks be organized to operate in somewhat the same manner that the National Conference on State Parks does for the whole country.

FEDERAL PROJECTS

The U. S. Biological Survey now owns and administers, as part of the Upper Mississippi Wild Life Refuge, two tracts of Mississippi bluff land near McGregor, known as Pike' s Peak and Point Anne. They are historic and magnificently picturesque. Up and down the river, as indicated on the map. are many miles of similar high rocky cliffs overlooking the valley of the greatest river. These bluffs, which are the outstanding scenic asset of this section of the country, and the finest thing of the kind on the continent, ***demand*** preservation. A few points are now in public or semi-public ownership: Pike' s Peak. Point Anne, the McGregor Wild Life School, the city park at Lansing and the State Park at Bellevue. The major part of the high river bluffs, perhaps fifty miles in total extent, remain in private ownership. They are in constant danger of commercial exploitation by camps, hotels, etc. The cutting of timber would damage them terribly. The immediate effect of the latter would be a double damage to wild life particularly — destruction of this wonderful habitat for birds and animals, and acceleration of erosion into the river, with its injurious effect upon spawning beds, muscle beds, and the breeding and feeding grounds of birds.

A strip averaging perhaps half a mile wide, or 15,000 acres in all. needs to be acquired by public agencies. It is out of the reach of the towns and counties alone. Likewise one state alone could not handle it. But joint local, state and

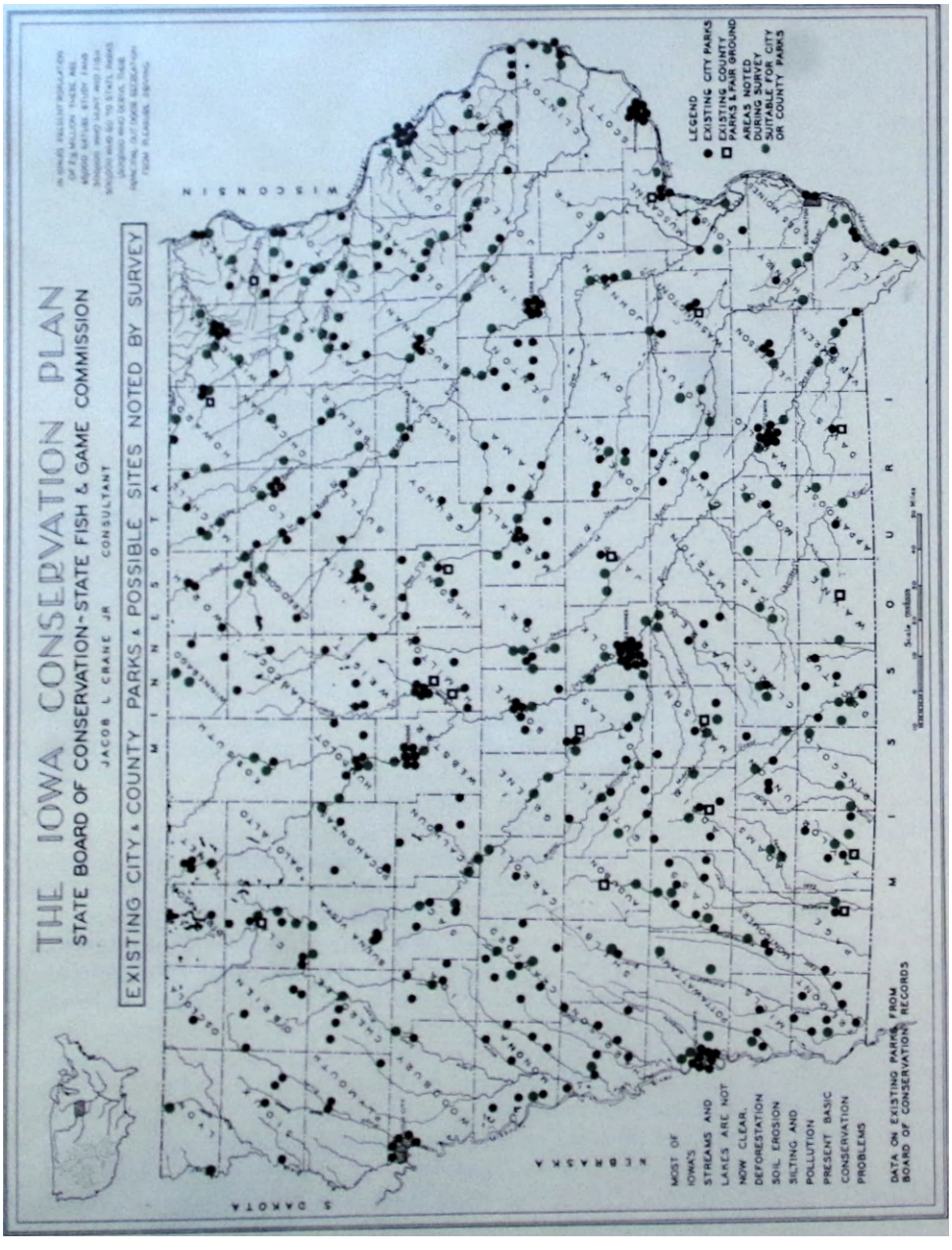


PLATE XLIX — LOCAL PARK SYSTEMS WILL ALSO DEVELOP

federal participation would make the whole thing relatively simple. An inter state park has been suggested here.

The logic of extending the Upper Mississippi Wild Life Refuge down the river to Keokuk, to include some outstanding waterfowl grounds, is discussed in the chapter in Game Conservation. That authority, in line with the Pike's Peak beginning, could appropriately be further extended to include participation in the acquisition of the faces of the river bluffs, especially in view of their bearing on the whole river wild life situation.

The initiative in this great project (small in cost relatively, but of the utmost importance and value), may properly come from the strongest agency, the federal government, through the Biological Survey. But cooperation and participation by the river towns and counties and by the state is essential for success.

FOR A NATIONAL MONUMENT

The northeast Iowa National Park Association. Mr. Walter Beall, President, has devoted itself for years past to the project of securing a national park on the Mississippi river bluffs near McGregor. The National Park Service indicates that a *National Monument* is within the scope of its program, to preserve and make accessible to the public of the country some of the most important Indian mound groups in North America. Both the state and the public of Iowa should be called upon to participate in the purchase of land for this National Monument, which would be of greatest value to the commonwealth. As this report is being written, the National Park Service is working on the designation of the most suitable areas.

CHAPTER XII

THE HIGHWAYS

The primary state highway system of Iowa approaches completion in so far as the laying of the roadbed and of the eighteen-and twenty-foot slabs are concerned. These white ribbons criss-cross the state between all the principal cities and towns. They provide main routes of commercial travel for passengers and freight, and they provide one of the most popular forms of outdoor recreation. In fact, it is estimated that 1,500,000 Iowans derive almost their only outdoor recreation from driving on these new hard roads. The State Highway Commission is completing a great task efficiently and expeditiously.

But after the pavements are laid down on primary routes, the highways as yet remain unfinished. The state highway authorities recognize that another big job is that of transforming these roads from the status of relatively crude development into perfected drives, beautiful and distinguished. While this whole project is the function of the State Highway Department, and not of the Fish and Game Commission and Board of Conservation, and while these two latter commissions should not intrude into the field of another state agency much better qualified than they are in this field, the highway improvement work so closely relates to other elements of the Conservation Plan that certain items are discussed here.

THE LANDSCAPE

Relatively few people see the rich Iowa landscape away from their homes except along the highways. The countryside as seen from the roads is to be enriched through the Conservation Plan by woodland conservation, by reforestation, by lake restorations, by artificial lakes, and by parks and preserves. But the landscape effect is dependent upon the manner in which the *views* from the highways are handled. Hence, as road construction and roadside improvement go on. recognition should be given to those features in the Conservation Plan which will enhance the pleasure of driving on the roads — views of lakes, forests and parks. Reference to the maps of the Conservation Plan will help determine what is feasible in planning the roads for this purpose, section by section.

THE ROADSIDES

The problem of the roadside resolves itself into two main factors:

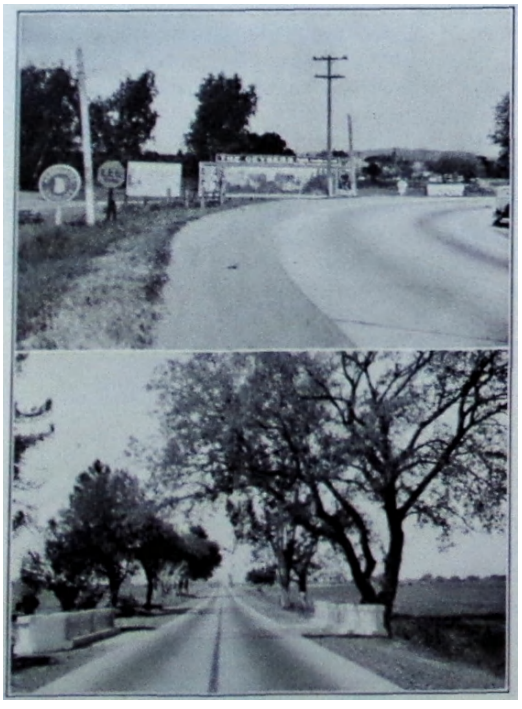
1. The need for ownership or control by the state or counties of rights-of-way wide enough to permit full development of all required elements.

2. The need for control by public agencies of commercial uses of private lands abutting the highways billboards, filling stations, etc.

The ordinary right-of-way must eventually accommodate the pavement, the pavement shoulders, the drainage ditches, footways, poles, lighting standards and planting — trees or shrubs or both.

For years the highway designers have recognized that the old sixty and sixty-six foot right-of-way is too narrow to provide for these requirements, and in recent times the Iowa Highway Commission has been acquiring eighty and one hundred foot strips for the usual eighteen or twenty foot pavement. With good design on such new rights-of-way, only one major difficulty remains, namely the matter of snow drifting which may be caused by low planting within the right-of-way lines. Each section of road must be studied from this angle. At some points the solution lies in planting only trees, at others, particularly on cuts or fills, shrubs may be used, and at others it may be necessary to use wider rights-of-ways. as discussed for the older roads in the succeeding paragraph.

A right-of-way sixty or sixty-six feet wide is not sufficient for a major high way. It will not accommodate the elements which must eventually go into it. For widening such rights-of-way two devices are available. First, strips seventeen or twenty feet wide may be purchased by the state to widen the right-of-way to one hundred feet. This is not expensive proportionately. At $100 an acre average for the land, plus the expense of moving back fences, such strips on both sides would cost approximately $1,000 a mile, or say, $1,000,000 for a thousand miles of highway. The roads cost something like $30,000 a mile in their narrow rights-of-way; a thousand dollars per mile additional for the critical widening of the right-of-way seems relatively a small cost.



Billboards on Open Road

Second, instead of buying the added width, it has been suggested that an easement might be taken for planting only certain light shade trees widely spaced. The farmers could still use the easement strip for chickens or even possibly for some crops. However, in Iowa this arrangement would ordinarily not be feasible, since the intensive use of most land would render the easement as damaging to the owner as the purchase. However, it might be used in some situations. But mainly, the sixty and sixty-six foot right-of-way requires widening to at least 100 feet by purchase. The design and development of these rights-of-way is then simply a matter of qualified talent either in the highway staff or by collaboration with the landscape department in the State College, which has given

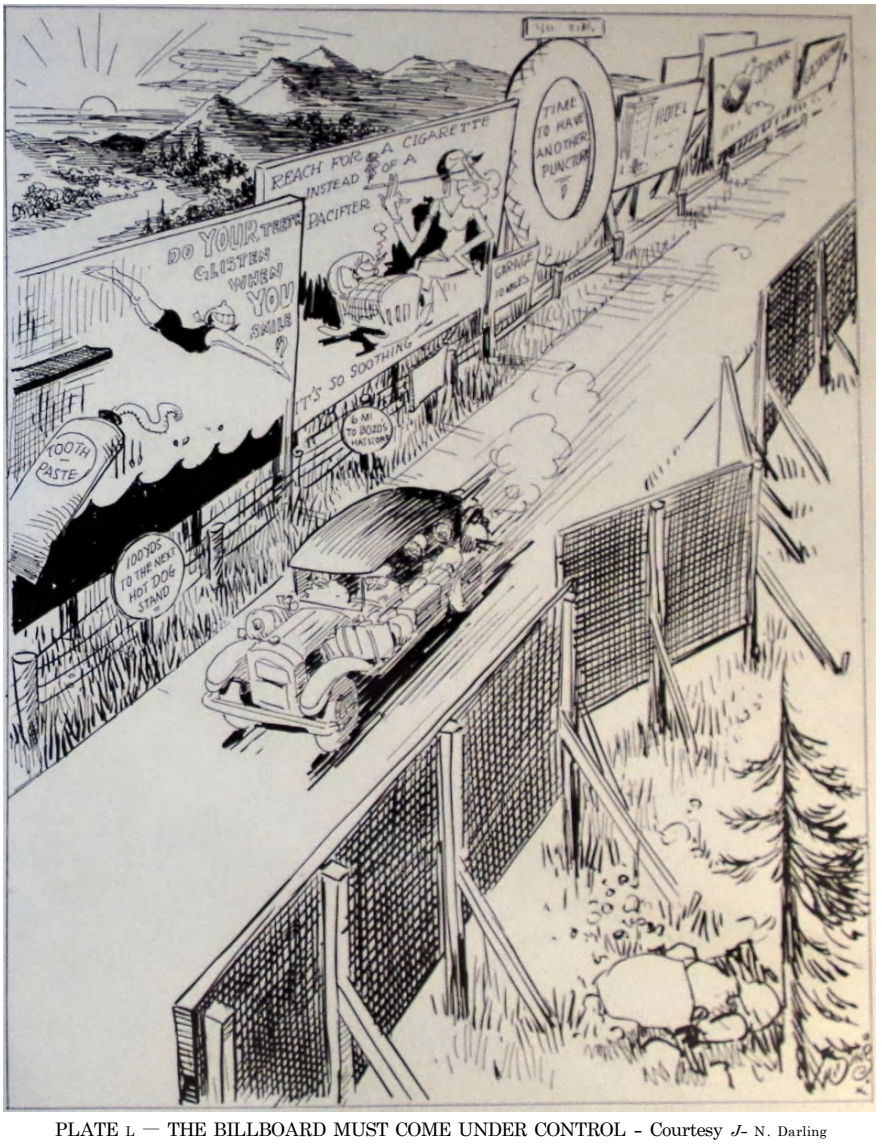


PLATE L — THE BILLBOARD MUST COME UNDER CONTROL - Courtesy J. N. Darling

PLATE LI — DRIVING IS VIRTUALLY THE ONLY OUTDOOR RECREATION FOR 1,500,000 IOWA PEOPLE — Courtesy J. N. Darling

the whole problem a great deal of study. It is anticipated that the highway department will be equipped with trained landscape men for the refinement of the alignment, grade, cuts and planting, and to advise with the other state agencies.

WILD LIFE

Every patch of low growth or of trees in Iowa has value for conserving wild life, particularly birds, of both shootable and non-shootable species. If the road sides could be allowed to grow up with volunteer plants or with planted material uncared for, an almost ideal situation for wild things would be created at little or no cost for maintenance of the vegetation. This, however, cannot usually be done because it would not control obnoxious weeds (they could scarcely be cut out from the other material one by one) and because of the snow-drift dif ficulty. It is assumed that district highway engineers and county highway engi neers will cooperate in permitting wild roadside growth to go undisturbed where ever possible, in line with the communications from the Fish and Game Commis sion and the Board of Conservation, but it is also considered that some assistance should be given them by qualified landscape men in the employ of the state agencies. Except at cuts and fills and curved sections, the primary roads of Iowa will generally require planted trees, but wherever small growth is appropriate and feasible, they should be used, and there are hundreds of miles of such road sides all told.

ROADSIDE PARKS

The two main types of what are here called roadside parks have already demonstrated their usefulness in Iowa in one example of each class. At Peterson, in Clay county, the highway department acquired, alongside the right-of-way. a small tract of land on the bank of the Little Sioux river; parking space, tables and benches, and playground apparatus have been provided and crowds of people stop there for picnics while out for a drive. This illustrates the roadside picnic park type.

The other class of roadside park is demonstrated by a small "turn out" area along the river highway between Muscatine and Fairport. just below Wyoming Hill. Here a car may turn off the road, stand without obstructing traffic, and enjoy the lovely view of the wide river valley. The available land at this im mediate point is not large enough to permit picnicking, but generally such spots should be big enough to allow at least a few car loads to have their lunch at such a picturesque spot.

Such roadside parks are in very great demand. During the course of the survey many suggestions for them have been submitted. They are so intimately associated with highway and right-of-way development and maintenance that they logically come within the highway improvement program for consideration by the State Highway Department. In the final highway program it is not too much to expect that roadside parks will be provided at intervals of twenty to forty miles along all the primary roads. The map designates the best points

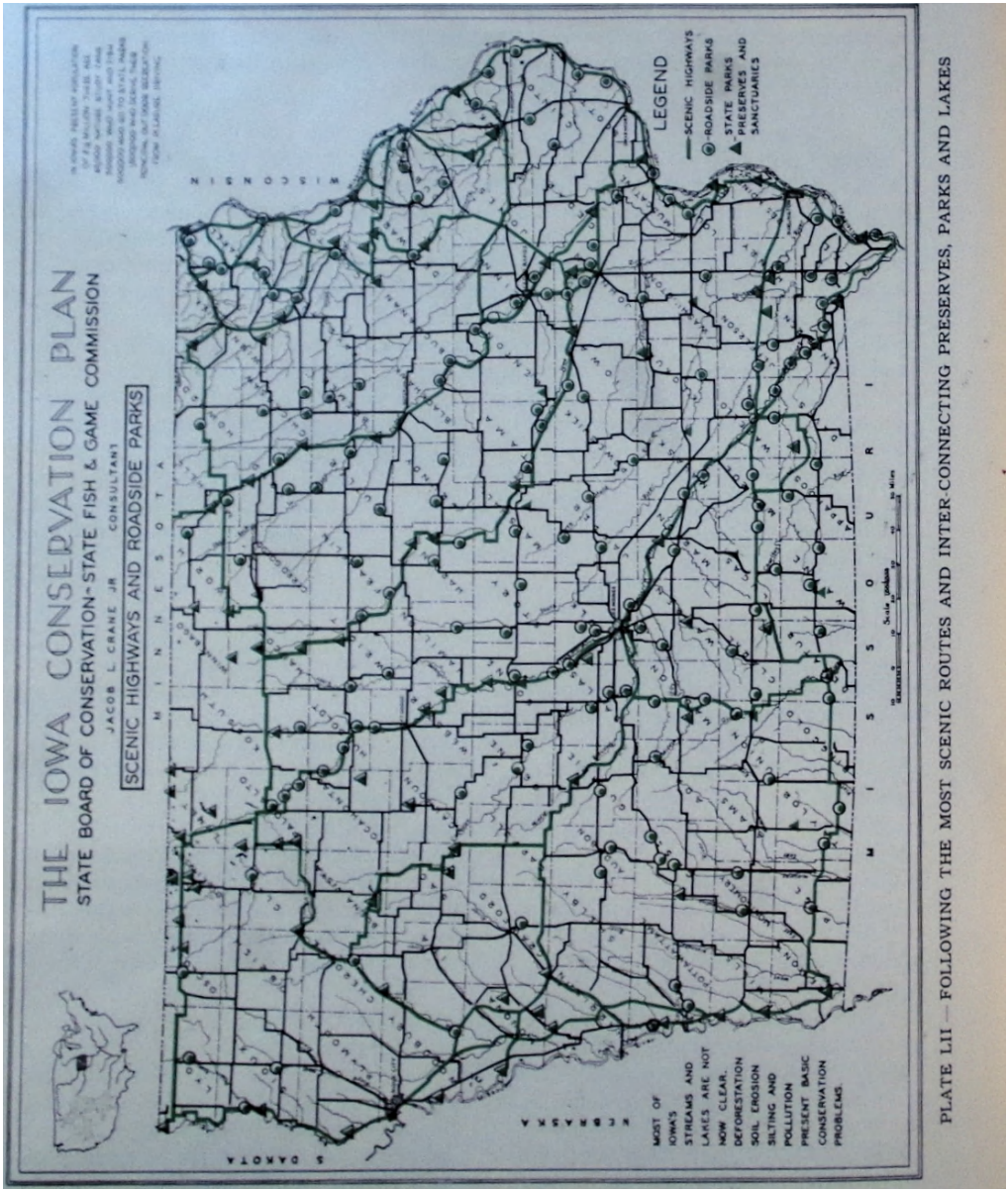


PLATE LII — FOLLOWING THE MOST SCENIC ROUTES AND INTER-CONNECTING PRESERVES, PARKS AND LAKES

discovered during the survey, as a start on an organized system of roadside parks. Some are of outstanding spectacular interest, such as Luster's Point, north of Marquette, on Route No. 13.

THE BILLBOARD

Everywhere in the country, and particularly close to towns, the scenic value of the American highway is damaged or ruined by billboards, filling stations, barbecue stands, etc. These damaging elements are certain to come under some type of control. They cannot withstand the public pressure against their un regulated effect. Several different measures of control are possible. The solution requires different treatment in different situations. In all these measures the State Highway Department is the agency most logical to head up the work, but support and collaboration will be necessary from the many interested groups.

a. County Zoning.

The ultimate solution of the billboard nuisance lies in county zoning, which can effectively control or prohibit them. This type of measure has been used for some years in Wisconsin, California, Maryland and Minnesota. Authority for county boards to zone is an essential part of Iowa' s legislative program. The use of that authority, when granted, should be stimulated and guided by a state agency, in this case probably the Board of Conservation, which in effect is becom ing a State Planning Commission. Many years will be required to bring this about.

b. Strip Zoning.

Pending the extensive use of county zoning, the State Highway Department, through its district engineers, may be given authority to regulate commercial uses of private property lying alongside primary roads, by interim strip-zoning rules.

c. Easements.

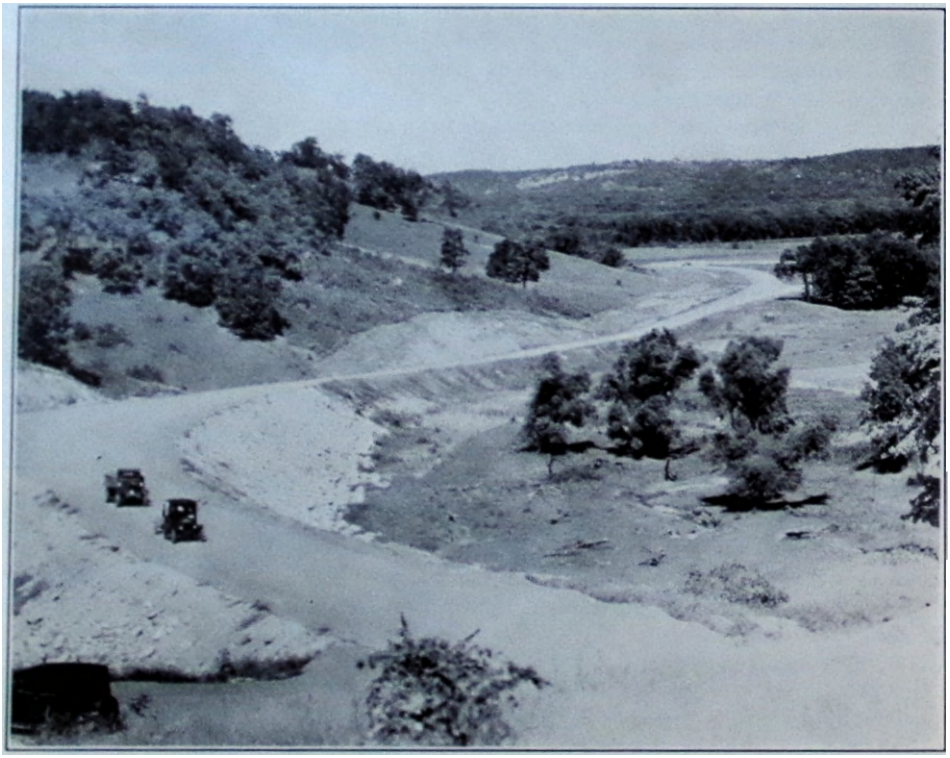
At critical points, where a fine view may be destroyed by billboards or bar becue stands, the State Highway Department may take an easement from the land owner, at nominal compensation to him, for the right to regulate commercial uses along the highways.

d. Licensing.

New Jersey and Massachusetts have billboard license and regulation laws operated under the highway authorities. The effect of these measures is not yet entirely clear. A similar setup may be utilized in Iowa, and it might be the best first step.

e. Regulation.

It is not impossible to draft and enforce state or county regulations limiting the size and frequency of billboards. Several billboard companies are now using a type of roadside sign which sets the pace. These signs are only about two by three feet in size, they are suspended nine or ten feet above the ground from decorative brackets hung on metal posts, and they are carefully designed. They leave the vision dear under them, they are more effective for advertising than the usual billboard, and they are vastly less damaging to the landscape. This commercial development indicates that regulations would not be unreasonable



A Beautifully Located Iowa Highway Now at the Critical Stage. Planting, etc.. Will Improve It; Billboard, etc. Will Ruin It*

limiting all roadside signs to this general type and permitting them only *at certain places* where they will not damage the landscape.

SCENIC HIGHWAYS

Contrary to the general impression throughout the country, at least half of Iowa's primary highways are definitely scenic in character. Further, the state's landscape resources offer many other feasible routes for new scenic highways. Hence, a tentative plan for a scenic highway system is included, as a suggestion for consideration by the State Highway Department.

The Scenic Highway Plan aims:

a. To include those sections of existing primary roads which have out standing scenic value.

b. To supplement these with new routes along the rivers and along the ridges.

c. To utilize existing rights-of-way for the new routes wherever they offer the best location.

d. To take advantage of the situation which is generally best for the ' 'river-ways," namely along the river bank itself where not subject to flood, and other wise along the slope back from the stream.

c. To interconnect the state parks, preserves, lakes, etc., in-so-far as feasible, creating a system of "parkways."

f. To provide the basic state-wide plan for scenic highways which can be supplemented by local city and county scenic drives.

On the scenic highways some measure to prevent destruction of the views by commercial uses alongside is absolutely essential. Any one or more of the types of control discussed above may be utilized. In addition, where *any* structures would cut off a fine view, easements should be taken from the owner of the ad joining land under which the owner, for a small consideration, agrees not to permit *any* building or billboard to be placed where it would interfere with the outlook from the road. This device has been used with success in Washington. D. C.. and in California. Probably no permissive legislation is necessary to use it ef fectively in Iowa.

TRAILS

Along the scenic highways particularly, footpaths or trails will be required, leading from one preserve or park or lake to another. The river-side easements for fishing access will tie in with them. A continuous trail should eventually be developed for the full length of the Des Moines river, for example, from Keokuk to the Okobojis.

Pin *Lake* ***in*** *Eldoea* ***State Park — An Artificial Lake***

CHAPTER XIII

RECAPITULATION—UNCLASSIFIED PROJECTS

There are so many items and aspects of the recommendations, even when as briefly stated as in this report, that it seems desirable to simply outline them in recapitulation. There is here listed only a summary of those Conservation Plan elements in which the Board of Conservation and the Fish and Game Com mission have some direct jurisdiction. The Roman characters, after the items, indicate the chapters in which they are discussed.

A — ADMINISTRATIVE ELEMENTS NOT INVOLVING CAPITAL EXPENDITURES

Board of Conservation:

State and county planning and zoning. In the long run this is the most significant suggestion of the whole plan. XIII.

Participation in general land and cover surveys. XIII.

Erosion control along streams, around lakes and on abandoned lands. V. VI, VII.

Reforestation, woodland management and forest reservations. VII.

Zoning of woodlands to regulate cutting. VII.

Control of the waste of deep well waters. VI.

Cooperation with the Health Department on remedying sewage pollution. VI, XIII.

Application of water power policy. VI.

Checking on effects of canalization in Mississippi and Missouri. VI.

Control of stock pollution in lakes. VI.

Disposition of drained lake beds. VI.

Zoning around lakes and parks and preserves. VI.

Participation in stream gauging. VI.

Participation in algae control investigations and measures. VI.

Establishment of legal lake levels. VI, XIV.

Survey of legal lake boundaries. VI.

Cooperation with National Park Service and Biological Survey. XIII.

Education on the Conservation Plan. VII. XIV.

Legislation. XIV.

Fish and Game Commission:

Further studies and surveys on certain waterfowl projects, certain upland game projects, and certain fisheries projects. IX. X.

Wild life and game research; fisheries research. VIII, IX, X.

Fisheries management (stream improvement, etc.). X.

Game management (cooperative areas, refuges, etc.). VIII. IX.

Leasing lakes and ponds for fishing and for waterfowl. IX, X.
Participation in general land and cover survey. XIII.
Cooperation on remedying sewage pollution. VI, XIII.
Application of water power policy. VI. X.
Checking on effects of canalization in Mississippi and Missouri. VI.
Participation in stream gauging. VI.
Participation in algae control investigations and measures. VI.
Education and public information. XIV.
Cooperation with Biological Survey, Bureau of Fisheries, etc. X, XIII.
Aid to individuals and organizations on planting, etc., for non-shootable wild life. VIII.
Advancement of fur-bearer production. IX.
Access easements along streams for fishing. X.

It is obvious that in carrying out the Conservation Plan the work of the two commissions inter-relates at nearly every point.

B — DEVELOPMENT ELEMENTS

Involving New Capital Expenditures

Board of Conservation

State Parks.....17 *
State Preserves..... 60 to80
State Sanctuaries..... 6*
Improvement ofNatural Lakes (participation).....40=*=
Development around major Artificial Lakes.
National Monument.

Fish and Game Commission

Upland Game Refuges, Nesting and Wintering Grounds.....100*
Special Wild Life Refuges..... 6=*=
Sanctuary for Marsh Life (participation)..... 1
New Public Shooting Grounds (waterfowl) — first program..... 40 =*=
Waterfowl Refuge Projects — first program..... 68*
Lake Restorations — first program..... 20=*=
Artificial Lakes — first program 13
Improvement of Natural Lakes (participation)..... 40*
Fish Hatcheries and Nursery Ponds.

In the latter list, many of the items are included under more than one heading.

The development projects of the two commissions are mutually interde pendent on a great many projects.

UNCLASSIFIED PROJECTS

Land and Cover Survey

The county soil surveys of Iowa are three-fourths completed; they must be finished and they will need some reworking from time to time. The topographic

surveys are only one-fourth completed! The much needed general woodland surveys have only been started. No land-economic survey has yet been under taken. Soil-erosion surveys need doing over most of the state. A surface-waters survey is necessary to a final water conservation program; and the sanitary exami nation of lakes and streams must be extended. The game-cover survey is thus far only general; a wild life survey would aid in the wild life program; and a com plete fisheries survey is urged. Now it is proposed that the several agencies con cerned in the various surveys, state and federal, get together at an early date and work out a cooperative program under which as many of these separate surveys as feasible be undertaken henceforth as one cooperative project, to the result of greater efficiency and great economy. This we recommend as the General Land and Cover Survey. Its very great values are touched upon at various points throughout the report. It is a big and expensive job, but for *economy,* it *must be done* sooner or later.

State Planning

It must be clear from this report that on all of the diverse factors affecting land uses, woods, waters, recreation, etc., much more detailed planning is essential to economy in development and to satisfaction in human living. To illustrate what is meant, a hypothetical county plan is here shown. Note the manner in which the problems of physical development tie together and require clear-sighted planning to avoid trouble and waste. *Every county in Iowa,* or every group of counties, will have to have its plan. That may sound far-fetched to some people, but it is plain to those who follow the trend of public work. Furthermore, such county or regional planning also *requires* for its success, a coordinating and guiding agency for the whole state. The Board of Conservation, or whatever corresponds to it after governmental reorganization, will have the Conservation Plan to supply the basic elements of such state-wide guidance of local planning. And that Board, or Department or Division, is destined inevitably to become a *STATE COMMISSION OF PLANNING AND CONSERVATION.*

The trend toward State Planning is strong in a great many states. Iowa, by pioneering in Conservation Planning, is in a fine position to proceed with State Planning and Conservation.

Control of Land Use

State and local planning, based upon the Conservation Plan and upon the Land and Cover Survey, will indicate which lands should be cultivated for certain groups of crops, which pastured, which forested or reforested, which re-established as marshes, etc. Such a plan for each county or region would have some effect by virtue of its obvious logic and by the fact that public agencies would tend to follow it. But it would have little effect in what now seems to be the most critical land-use question in this country, namely the matter of transferring from cultivation to pasture or forest or wild life refuge, not only the submarginal and waste lands, but also the semi-marginal lands. Let us say that the land and cover survey has determined that fifteen per cent of Iowa cash-grain land should go out of that use

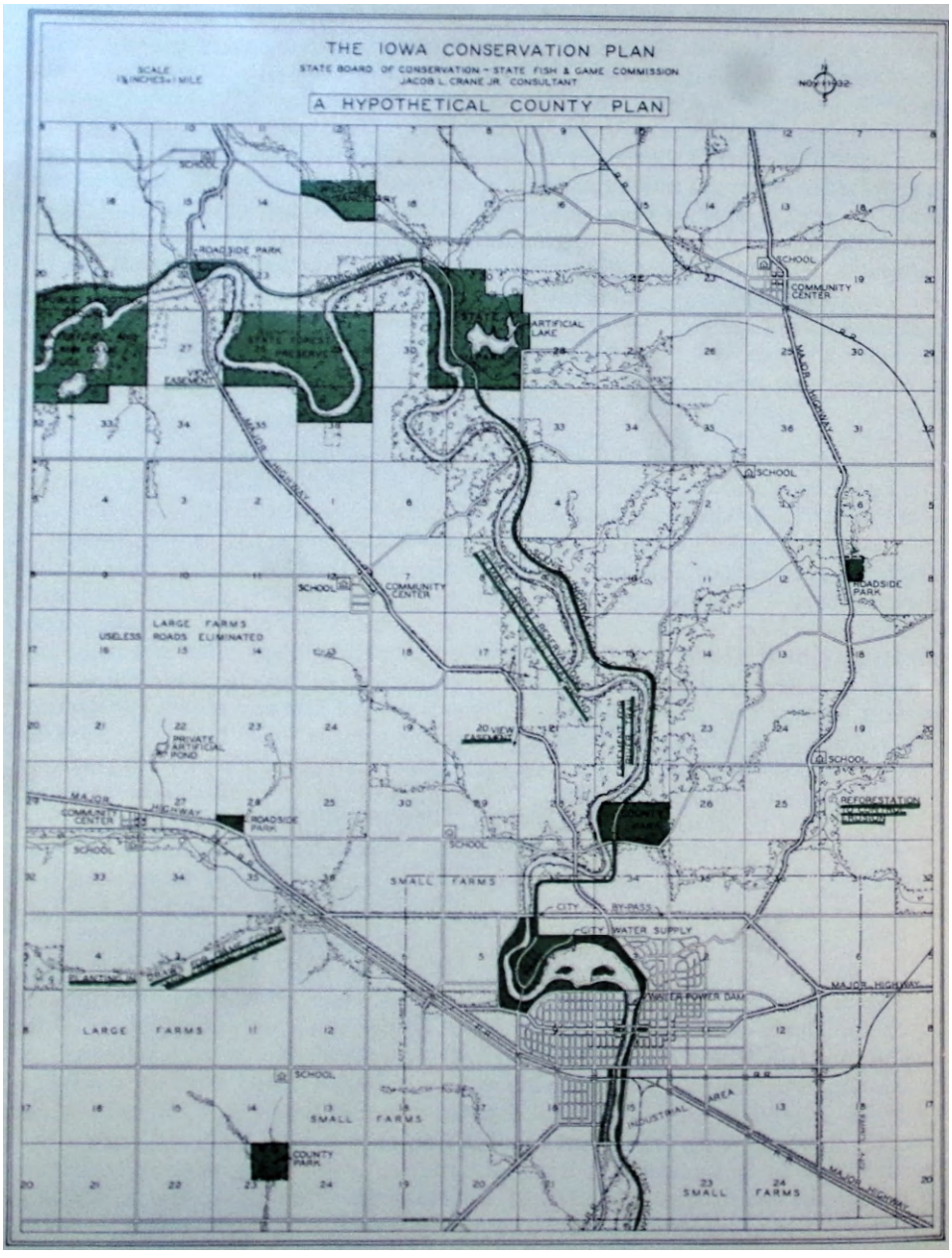


PLATE LIII - LAND PLANNING — COUNTV AND STATE ZONING — CONSERVATION PLANNING GUIDED BY STATE PLANNING

and probably into some non-agricultural use.* How can that be achieved, and what is to be done with such non-agricultural lands? Being marginal they might very well be given to the state, which could then transfer them to the logical. *planned* use. But, since such land may be semi-marginal and not actually waste land, and since the land owner would be tempted to work it in the hope of prices to justify the cost of production, much of it might be held in cultivation.

"Zoning" has already been recommended in this report for guiding development along highways, around state preserves and parks and around state lakes, and for preserving woodlands. Zoning is now suggested as a means for controlling land use under a rational plan in a manner equitable to all. Each landholder hesitates to keep his semi-marginal land out of cultivation since his action alone only makes the situation better for the owner of some other semi-marginal land. Zoning, *on a state-wide* basis, could help all owners to accomplish what they cannot accomplish individually. This is a suggestion of enormous importance. It would not supercede, but would work in conjunction with other measures of an "economic" nature, such as the domestic allotment plan, and federal or state participation in the leasing or purchase of marginal land throughout the country. It is not expected that this suggestion will be put into effect at once, and in fact years of survey and legislative work will be required for its accomplishment. However, it seems clearly indicated by the trend of events. Guidance of the use of urban property through zoning is now well established throughout the United States. The extension of the principle for the purpose of classifying and guiding the use of rural lands is a matter of logical sequence in view of the chaos now facing us in the whole problem of land utilization.

A Sanitary Water Board

The State Health Department, the Fish and Game Commission and the Board of Conservation are all vitally interested in cleaning up the streams and lakes. Consistent collaborative work of all three is required to solve the problems, both technical and administrative. A Sanitary Water Board made up of the Director of the State Health Department and the chairmen of the Board of Conservation and of the Fish and Game Commission (or similar membership after reorganization) could be set up to dove-tail the interests and activities of the existing agencies without creating any new commission. This is recommended for consideration.

Cooperation with Federal and Other Agencies

The Conservation and Planning agency for the state of Iowa must be prepared to cooperate and collaborate on an equal footing of technical personnel, etc., with many outside agencies.

National Park Service on the National Monument.

National Forest Service on woodland conservation policies, and on woodland surveys.

*A determination which requires both the state land and cover survey and an outline national land allocation plan.

The Federal Bureau of Public Roads on Roadside Improvement.

U. S. Geological Survey on Stream Gauging, on Topographic Mapping and on Water Resources.

U. S. Bureau of Fisheries on Fish Management.

U. S. Biological Survey on Wild Life and Game Management and on Mis sissippi and Missouri River problems.

U. S. Bureau of Agricultural Economics on Land Utilization.

U. S. Bureau of Soils on Erosion Control.

The neighboring states on fish and game laws and river developments.

Several other state agencies such as the highway department, the State, College, etc.

CHAPTER XIV.

FULFILLMENT OF THE CONSERVATION PLAN

The successful fulfillment of the conservation plan is dependent upon four things:

1. Good Organization, both official and unofficial.
2. Adequate Finance.
3. Permissive Legislation.
4. Strong Public Support.

ORGANIZATION

The matter of consolidating Fish and Game and Board of Conservation activities in one agency has been under discussion for a year or more and that discussion is brought to a focus by the present urgency of economy in the state government. As this report is being written, a governmental reorganization survey is in process under a joint committee appointed by the Governor and a staff of experts from the Brookings Institution. Conclusions on the consolidation of the Fish and Game Commission and Board of Conservation will no doubt await the findings of the Brookings survey. Meanwhile, the conservation plan survey has determined several vital facts bearing on this question. First, the work of the Commission and the Board are intimately inter-related in almost every field of conservation and state planning. They must work together closely, whether or not they are consolidated. Second, there is now very little actual overlapping, and consolidation would not effect any great economies so long as the work is not expanded into the wider fields recommended for the Conservation Plan. In the situation of the present moment, there would be little if any saving on personnel or on any development contemplated for immediate action. Third, with the work broadened to include the many new phases of conservation and planning proposed by the Plan, such as erosion control, woodland conservation, lake improvements, the waterfowl projects, research, zoning, etc., etc., a consolidated Board or Department could work more economically than the separate Board and Commission. In other words, more effective work could be done with the same funds; the state could get more for its money. Hence, we conclude that immediate consolidation is not necessary and probably not desirable. We further conclude, however, that in the future consolidation should be effected, and we so recommend. We also recommend that if and when consolidation takes place the single agency be designated the Department or Board of Conservation and Planning, to include in its scope the many ramifications of its work described in this report. And in such a Board or Department there might very well be incorporated the State Geological Survey, since its activities so closely relate to the others.

Whether merged or operating separately, the personnel will have to be expanded to put the conservation plan, with its great economies, into consistent

effect. The Fish and Game Commission staff has been greatly strengthened during the past year, and at no increase in cost, although the loss of W. E. Albert, former State Game Warden, is a severe one. The most urgent need now is for a thoroughly trained fisheries technician, one who *knows,* or knows how to find out. all the enormously intricate solutions for the extremely difficult fish con servation problems, such as biological management of natural and artificial lakes, fisheries surveys, stream improvement, and hatching and rearing practices.

The staff of the Board of Conservation is pretty well organized, but the very effective Superintendent is overloaded with work even now, and the extension of the program requires assistance for him. Expansion of the personnel at this point may be considered temporary until such time as the final organization or reorganization has been perfected.

Another administrative matter should be mentioned here. A tradition in both the Board and the Commission tends toward much detail work by the mem bers themselves, which leads to some confusion in the field and also to meetings so overburdened with smaller questions that the major problems of policy and fore sight suffer to some degree. The *staff* should be adequate and competent to pass on all detail matters, making recommendations to the Board and Commission and in turn carrying out their *policies,* not their detailed instructions.

To make the Conservation Plan effective, the administrative organization naturally falls into several groups or divisions, as outlined below. Some such classification and subdivision of the work will be logical and most efficient whether or not the Board and Commission are merged.

A — DIVISION OF LANDS AND WATERS — Chief of Division

1. State Preserves and State Parks — Superintendent, custodians.

2. State Lakes and Streams — Superintendent.

3. Erosion Control and Woodland Conservation* — Superintendent, dis trict managers.

B DIVISION OF FISH. GAME AND WILD LIFE — Chief of Division

1. Fisheries — Rescue, hatcheries, rearing, distribution, census, surveys, seining — Superintendent, managers, foremen, etc.

2. Game and Wild Life — Game management, refuges, etc. — Superinten dent and district managers (possibly same as erosion control and woodland con servation district managers).

3. Enforcement Section — Superintendent of Wardens — District managers, local wardens.

• To be developed in conjunction with the State College.

C — TECHNICAL DIVISION — Chief of Division

1. State Planning and Zoning — Land Utilisation'. etc.

2. Engineering and Construction — Superintendent and engineer, consulting hydraulic engineer.

3. Landscape and Architectural Design — Landscape architect, special architects.

4. Research — Wild life, fish, and game — at State College. Special biological investigations. Entomology.

5. Geological Survey — Mineral resources, ground waters, etc.

D — SECRETARIAL, PUBLIC RELATIONS AND BOOKKEEPING
Secretary Office Manager — Publicity — Clerks

It will be noted that the work of division A lies in the field of the Board of Conservation, and Division B in that of the Fish and Game Commission. Divisions C and D are now divided between the Board and the Commission, and may be continued in that manner, with coordination and joint action between the two. Eventually there would be economy and greater effectiveness with these divisions operating under one Board or Department of Conservation and Planning.

For a Department or single Commission, with these several divisions of the work, a director would naturally be installed, to centralize and head up all the activities and to be responsible for its success. It is probable that an assistant director will also be required sooner or later.

Whether or not the Board and Commission are consolidated, it will be found desirable to keep in contact with the work three or four consultants; one consultant on conservation and planning, one on fisheries, one on game and wild life, and one on hydrological problems. Preferably they should be the men who have become intimately familiar with the Iowa situation through the survey and the preparation of the conservation plan.

In whatever manner the administrative organization is developed, it is extremely important to work with and through other unofficial agencies; the sportsmen' s groups, the garden clubs, women' s clubs, civic and commercial clubs, nature-study and scientific organizations, farmer' s groups and 4-H clubs and such associations as the suggested State Park Conference.

° To include representation of Board and Commission in organizing Land and Cover Survey.

FINANCE- FISH AND GAME

The major items of capital expenditure (land acquisition and physical de velopment) in the fish and game and wild life program, total approximately as follows:

Waterfowl and Upland Game Projects, lake and marsh restorations, land acquisitions, etc. — first program $400,000, ultimate program	$600,000
Special Upland Game Refuges and Sanctuaries	60,000
Lake Dredging and Improvements, proportion	800,000
Fish Rescue and Fish Culture Projects	40,000
Artificial Lakes, first twelve $500,000, ultimate pro gram	1,000,000
Total	$2,500,000
Allowance for unforeseen and under-estimated items — twenty per cent	500,000
	$3,000,000
Share to be provided by local subscription on artificial lakes, restorations, dredging, etc	500,000
Net total	$2,500,000

Over a period of twenty-five years this is only $100,000 a year. But that is too long to wait. For a period of sixteen years about $150,000 a year will be re quired for the fish and game development program.

The administrative cost, when the work is fully under way, is estimated to run about $350,000 a year, or roughly fifty per cent more than it totals now.

The Fish and Game Commission received in 1931 about $300,000, largely from fishing and hunting license fees. The 1932 total was considerably less. Nearly all of this fund is required for administration costs*, and only a small amount is available for capital investments (land acquisitions and physical de velopment). To carry out its program, the program demanded by the sportsmen and the conservationists, the fish and game and wild life diversion requires:

	Per Year
For Administration	$350,000
For Acquisition and Physical Development	150,000
Total	$500,000

With this fund available, fifteen years or more will be required for the com pletion of the recommended program : and plainly most items in the program can not be deferred for ten or twelve years without arousing great impatience on the part of those who want the use of the facilities. *The Fish and Game Com mission must derive from increases in the present very low license fees, about twice the present total from that source.* Further, *that fund*

• See biennial reports.

must be kept relatively inviolable for use on the Fish and Game and Wild Life program, and must not be diverted to other uses.

FINANCE — GENERAL CONSERVATION

The major items of capital expenditure for carrying out the recommended general conservation program are estimated approximately as follows, for land acquisition and development:

State Preserves and Sanctuaries (including developments at artificial lakes)	$1,100,000
State Parks	1.800,000
Lake Improvements, dredging, etc., proportion	200,000
Total	$3,100,000
For undetermined and underestimated items twenty per cent	600.000
	$3,700,000
Share to be provided by local subscription	700.000
Net total	$3,000,000

The Board of Conservation has received by appropriation of the legislature for the biennium from July 1. 1931, to July 1, 1933. $120,000 per year, an extremely meager fund for all the things demanded of it by the people of the state. And the budget may be even further reduced for the next biennum. It has received from other sources, principally sand and gravel leases, about $25,000 a year; but this figure is also decreasing.

Division of Available Funds, 1931-1932

	Per Year
Available for roads in state parks	$30,000
Required for all administration, approximately	80,000
Available for land purchase and physical development. other than roads	35,000
	$145,000
During the period 1933-1935 the available total will probably not exceed $120,000 a year.	

The program demanded for general conservation will call for an administrative outlay (for central overhead, custodians, woodland management, etc.) which will increase gradually from the probable 1933 figure of $75,000 a year to a total of probably $150,000 a year, fifteen years hence.

The $3,000,000 program of land acquisition and development, if spread over fifteen years, requires an average of at least $200,000 a year. There must be available then, during the sixteen years after the program is commenced in earnest:

		Per Year
First Two Bienniums —	Administrative	$ 75,000
	Development	150,000
		$225,000
Second Two Bienniums	Administrative	$100,000
	Development	150,000
		$250,000
Third TwoBienniums —	Administrative	$125,000
	Development	250,000
		$375,000
Fourth TwoBienniums —	Administrative	$150,000
	Development	250,000
		$400,000

These are very modest sums for a program offering all that the Conservation Plan includes. They are no greater than would be necessary and forthcoming without any plan to guide the work in an orderly and economical manner. If once a year each family in Iowa contributed only fifty cents, the financing would be accomplished. It comes to the same thing when provided by appropriation or by other means.

On less comprehensive programs Indiana. Wisconsin and Michigan expend from twice to four times as much as Iowa has made available for this work. Several methods are possible for deriving a reasonable fund for the general con servation division of the Conservation Plan:

Increased appropriations by the legislature.

Admission fees to State Parks, which, if undertaken, might yield only $50,000 a year.

Special service fees in State Parks.

A mill tax for this work specifically.

Increased automobile driver's license. A fee of $1.00 for driver's licenses would make it worth while for the applicant to go down for a license, and, after deducting administration and examination costs on issuing licenses, a sufficient total would remain to support the Conservation program.

A very *small part* of the automobile or gasoline tax revenue or of the cigarette tax would accomplish the same purpose.

One first big task for the Board of Conservation or its corresponding division in a new Department or Commission is the purchase of lands which, during any long interval, may be destroyed by cutting of timber, or which may be com mercially exploited. The *most urgent* purchases total $300,000 to $500,000 at present low land costs. For this reason alone the Board's fiscal setup must be arranged as soon as humanly possible.

LEGISLATION

A considerable list of permissive legislation and revised legislation is required for the conservation plan. The items are here named more or less in the order of their urgency. The Roman characters indicate the chapters in which the items are discussed.

Revision of Fish and Game Code:* authority for Commission to regulate seasons, trespass protection, etc. IX.

Increase in fishing and hunting license fees.* IX, XIV.

Authority for Board and Commission to purchase land under contracts which extend beyond one biennium. This may be difficult or impossible under the Iowa constitution.

Authority for Board to regulate commercial uses of land around state lakes and state parks and preserves.* VI, XI.

Authority for Board to establish legal lake levels.'

Authority to place water power fees in a special fund for use in surfqfe water conservation — stream gauging, etc.*

Authority for state to accept the waste land part of a farm which the farmer finds is only a burden to him and which he wishes to have the state take for erosion control, etc. V, VII.*

Provision for the state to take at tax sale such lands as it determines neces sary for conservation purposes. V, VII.

Authority for improvement of lakes;* eventually by special assessment on benefited property. VI.

Authority to lease land from private owners for a period longer than a biennium.

Regulation of water power projects and use of water power lakes and abutting land. VI, X, XI.

Regulation of timber cutting by "zoning" type of control. VII.

Authority for Highway Commission to construct roads in state parks, etc., out of highway department funds.

Re-establishment of topographic mapping, and the initiation of a compre hensive land, water and cover survey. XIII.

Authority for Highway Commission to undertake all phases of roadside beautification and scenic highways.* XII.

Authority to designate lands for future purchase, within a specified period, and to make agreement that no buildings, etc., will be placed thereon.

Added authority for Board in policing parks and lakes.'

Authority for the organization of park districts of any size.* XI.

Authority for county planning and zoning. XIII.

Provision for licensing billboards, etc., or for strip zoning.* XII.

Control of ground water wastage. VI.

• These measures an under consideration in the 1933 legislature.

PUBLIC SUPPORT

We believe that the people of Iowa are now keenly interested in conservation. The public interest is based on a real desire, in fact a strong demand, for the things to be accomplished and to be provided. The conservation problems revolve in the main around two phases of human activity, the economic and the recreational.* The economic factors are those dealing with the wise use of soil, woodlands and waters. The recreative phase deals with the countryside landscape, state pre serves and parks, hunting and fishing and nature study, and the highways and trails, all for purposes of enjoyment of the outdoors by the public of the state. In both of these fields the attitude of the people generally ranges from indifference, at the worst, to a passionate interest in the conservation movement. There is little opposition or negative attitude. This situation is due, on one hand, to the knowledge of rural problems which permeates the entire population, and on the other hand to the educational work which has been going on for a generation. Many individuals have devoted themselves to this cause, notably Dr. Macbride, Dr. Pammel. Dr. Shimek. the members of the Board of Conservation through its several terms, and of the Fish and Game Commission, the leaders of the Isaac Walton and Will Dilg leagues and of the ornithologists, the garden clubs, the Academy of Science, many county engineers and farm agents, members of the American Legion, women' s clubs, civic organizations, of the extension staff at the State College, and of the legislature and state officials. All of these, and more, have talked and written and worked to promote the conservation movement in this state. With such wide-spread advocacy through a considerable period of time, the purpose and value of conservation have become quite well known, in contrast to the situation in many other states. As a result, the conservation plan becomes essentially a record and expression of the present desires of the people of Iowa.

Further, a review of the sequence of events in territories occupied for a longer time indicate that conservation, as dealt with in the recommended plan, is in the direct line of development. Measures to conserve the soil, the forests and the waters have been established for generations in the European countries, and they have been introduced extensively in this country during the last forty years. From primitive settlement, with relatively crude, hasty developments and ex ploitation of natural resources, human activity proceeds, by necessity and by logical sequence, to the recovery and "finishing" period. Human life on any land area *changes* the character of the environment, inevitably. To meet our human needs for economy, beauty, health and convenience, the changes are finally brought under deliberate control and the early days are followed by an era of more careful and thoughtful arrangement of every detail. The use of land is rationally allo cated and more scientifically carried on, woodlands are preserved and restored, the streams and lakes are placed under *management,* wild life is protected and fostered, provision is made for outdoor recreation, the whole countryside takes on

*Tbe scientific phasr has to do with facilities for research into biological, botanic and geological problems and with the sound determination of procedures for economic conservation and recreational facilities.

a more humanized and finished character, with special preserves for saving examples of the original wild country. Thus, conservation in Iowa, may be considered *inevitable.* It has started its work at a great many points. It will proceed by the force of circumstances and the logical sequence in events of human living, whether or not there is a plan to guide it. From this standpoint there need be no hurry to promote or force ahead the conservation movement.

We conclude, then, that because of the widespread interest and support already existing, and because it lies directly in the line of natural sequence, the idea of conservation does not require "selling" to the people of this state. Educational work should continue and expand; certain suggestions in this field are made below. But the principal need is to *inform* the public about the plan and the economies and satisfaction to be derived out of following it in a consistent, far-sighted way. Not conservation in itself, but *conservation planning* must be impressed upon the public mind, if orderly development is to proceed and effort and money are to be saved during the next twenty-five years. Inform the people of Iowa about the Conservation Plan.

In doing this, certain fundamental concepts should never be lost to sight.

1. The whole state owes itself the preservation of the out-of-doors, based on a new appreciation of out-door values as related to our intense manner of life.

2. The farm families of the state are entitled to those finer elements of living which cannot be measured in dollars and cents; and only by providing some of them through the conservation plan can the countryman's support be gained and held.

3. In the conservation program the landowner and farmer arc the custodians of the out-of-doors. For this custodianship they are entitled to some form of compensation, which may mean compensation in dollars and cents, but. most important, it means compensation in the form of giving the farmer a part in the program, in the form of protection against trespass, and in the form of a finer, more varied life.

4. The farmer, if he is the custodian of the out-of-doors, and if he is to receive assistance from conservation groups, is under a certain obligation to share the outdoors with the general public.

5. The youth of the state will be interested in the conservation plan. The program will be of greatest value to the boys and girls now in school. And many phases of conservation can be accomplished only by the work of 4-H clubs, nature study groups, and in fact, by all of those who are still in their teens at the present time.

This educational program should be directed primarily to the country people and to the young people, and secondarily to the citizens of the towns.

For this purpose it is recommended that a sort of conservation hand-book be prepared, incorporating in brief form much of the material found in this report, and well illustrated. This conservation hand-book should be printed in large numbers for use in the schools and among adult groups throughout the state, and particularly in the rural districts.

It is also suggested that prize essay contests be organized in which younger high school students may compete for substantial prizes. Topics could be used having to do with the value of outdoor recreation, the use of state parks, preserving the woodlands, wild life, the conservation plan, etc., etc., and photographs could supplement descriptive material. Such contests might be held every year or every two years, for the whole state. They would serve to stimulate interest and to disseminate knowledge at relatively small cost.

As a part of the material submitted in connection with this report, a set of three very small stages has been made, each stage illustrating several phases of the conservation plan. With them are mounted several colored maps showing the plan in a generalized way and also in some of its details. This exhibition material may be used at the state fair, at county fairs, at local and state-wide meetings, and for permanent display in some appropriate place. It presents conservation plan principles in graphic and dramatic form.

Finally, the general public information work should continue and be ex panded. through lectures, meetings, radio talks, newspaper and magazine articles and personal contacts.

Outside Iowa great interest has been displayed in the conservation plan, particularly since it is the first undertaking of just this kind in the country. Within Iowa, the whole enterprise is arousing interest and support. Meager appropriations and limitations on sportsmen's license fees at this time should not be considered serious set-backs. The powerful demand for conservation measures, the great need for them, and the inevitable logic of events are bound to put the Iowa Conservation Plan into effect through the will of the people.

The Iowa Conservation Plan provides for orderly, *economical* development in wisely using the state's natural endowments. It is an expression of the present demands and the future requirements of the people. Iowans have been dreaming conservation for a generation. The Conservation Plan crystallizes those dreams, extends them, and brings them to the point of practical realization.

Th≫ Three Little State Prepared to Illustrate the Conservation Plan:*

Left: Problem ot Erosion. Woodland Conservation. Land Tenure*
Center: A State Preserve or State Park
Ritht: The Country Landscape and Roadside Development

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