Michigan

DEPARTMENT OF NATURAL RESOURCES

DROUGHT RESPONSE PLAN

Prepared by

Office of Water Resources

July 19, 1988

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DNR DROUGHT RESPONSE PLAN

INTRODUCTION

To address the current drought conditions in Michigan, an issue management task force has been formed in the Department of Natural Resources at the request of Director David Hales. The objective of the task force is to develop both short-term and long-term strategies for dealing with drought conditions in the state. The multidisciplinary task force includes staff from both the Resource Management and Environmental Protection Bureaus. Overall coordination will be provided by the Office of Water Resources.

The Advisory Committee to the Office of Water Resources will provide a forum for information exchange and issue discussion between the state and key interest groups. This will build support for implementing recommendations in the short-term drought response strategy. Interest groups presently represented include regional planning commissions; soil conservation districts; agricultural extension offices; drain commissioners; watershed councils; universities; county and township associates; local governments; and public and private interest groups.

The Interdepartmental Committee to the Office of Water Resources will facilitate coordination among the Departments of Agriculture, Attorney General, Commerce, Public Health, Natural Resources, and Transportation. Interstate coordination will occur through the Great Lakes Commission and the Great Lakes Council of Governors.

BACKGROUND

Resource management decisions made during the present drought will require accurate and regularly updated information. A temporary information management system has been established to assist the Director and Department managers in making decisions during the drought. Weekly meetings will be held by the

Office of Water Resources to assess drought conditions and review Department actions.

Water Availability and Quality: Michigan is located in a region of the United States characterized by fairly abundant precipitation, extensive stream and lake resources, and generally reliable glacial and bedrock groundwater supplies. The state is surrounded by the Great Lakes, which contain one-fifth of the world's supply of fresh surface water. There are localized areas with degraded water quality in Michigan, but generally the state's water quality is very good. Even with this strong resource base, water shortages, use conflicts, and water quality problems can occur when water resources are stressed.

Discharges to Michigan waters must have NPDES permits. The treated discharge must meet water quality standards at the design flow for the receiving water body. The design flow is the lowest monthly 95% exceedance flow. A 95% exceedance flow is the flow that is equaled or exceeded 95% of the time for a given month. The lowest monthly flow is usually in August.

Alteration of Streamflows and Lake Levels: The availability and quality of water resources during drought conditions will be influenced by the operation of hydroelectric dams, impoundments, and lake level control structures in Michigan. These man-made structures are used to raise water levels for power generation, to stabilize fluctuating lake levels, to store water for public water supply, irrigation, and industrial uses, and to create recreational areas. They are capable of significantly altering streamflows and lake levels, changing the dynamics of the hydrologic system throughout all or part of a watershed.

The most significant impacts during droughts occur when natural overflows are restricted to maintain water levels behind these structures. The short-term fluctuations of streamflow that result from the subsequent operation of these structures may be extreme, as is the case when hydroelectric dams store and release water within a few days to meet peak power demands. These fluctuations can cause serious impacts, including

streambank erosion, streambed scouring, and damage to fish and biological communities.

Water Uses and Conflicts: Drought conditions pose an increasing threat to present water uses in Michigan. Currently, the major uses of water are for thermoelectric power generation, industry, public water supply, and irrigation. Collectively, they account for over 98% of the water withdrawn in the state. The major source of water is the Great Lakes, which supply 90% of these withdrawal uses and should remain a reliable source of water supply for the short term. The remaining 10% is from inland lakes, streams, and groundwater. As the drought continues, supply shortages for these resources may become serious.

Specific water demands in Michigan vary depending on the particular use. The largest demand is for cooling water for the 91 thermoelectric power plants in the state. However, virtually all (97%) of this water is returned to the Great Lakes after use. Most of the industrial water demand is from 400 - 500 large industries, primarily in automotive, chemical, and paper manufacturing. Over 600 municipal water supply systems are operated in Michigan. The largest is the Detroit Metropolitan System, which accounts for 60% of the public water supplied in the state. Finally, there are 3,000 - 3,500 irrigators in Michigan, with the largest concentration in the south west and west central Lower Peninsula.

In addition to major water withdrawals, there are important instream uses of water that will be affected by drought conditions. They include recreation, fisheries and wildlife habitat, hydroelectric power generation, and navigation. These uses contribute significantly to the state's economy and quality of life. However, their benefits are often difficult to quantify.

Complaints against irrigation water withdrawals are typically made by other riparian landowners, either downstream or on a shared lakefront. Since irrigation water use consumes 95% or more of the water that is withdrawn (through evaporation, transpiration, and incorporation into crops), virtually none of the water is returned to its source after use.

Further compounding the impact is the timing of irrigation withdrawals, which take place during the summer months when streams and lakes are at natural low levels.

Water Rights: The legal framework that governs inland surface water resources in the state is based on common law riparian doctrine. Under this doctrine, owners of land that is in contact with a stream or lake have certain water rights which entitle them to a reasonable use of the riparian water. Non-riparians generally have no water rights other than those associated with the public trust, although exceptions occur in the form of statutory laws that extend or restrict certain water rights for particular activities. Further distinctions are made for municipalities, which are often granted special authority to obtain water for public supply. In general, however, the use of inland surface water resources in the state is governed by common law riparian doctrine.

The legal frameworks that govern water quantity issues related to surface and groundwater have developed separately, and the courts do not recognize the interconnection between the two resources. In the case of groundwater, the legal framework is unclear. On the basis of limited case law, however, it appears that Michigan's courts will follow the reasonable use rule to determine the rights that landowners have to use groundwater.

Water Conservation: There are two basic approaches to water conservation: supply management and demand management. Since supply management requires improvements in the construction and operation of water supply systems, it is typically a longer-term strategy. During drought conditions, demand management - i.e. reducing user demands for water - can be quickly implemented and is more apt to produce immediate results. Demand management techniques that are often utilized include:

> Education: The first option is to develop and implement an educational program to inform users of the need to conserve water, the benefits of conserving water, and specific actions they can take

to reduce their water demands. Programs can be carried out at all governmental levels.

Regulation: A second option is the adoption of mandatory restrictions on water use by municipal governments. This could include local ordinances limiting or rationing water uses such as lawn watering, car washing, or other activities. Such restrictions could be quickly implemented and could achieve immediate results.

Pricing: A third option is for municipalities to change water rates to encourage water users to conserve. Increased water rates have proven effective in reducing residential peak water use and commercial and industrial average water use. Since price increases are more likely to be opposed by users, they could be adopted on a temporary basis.

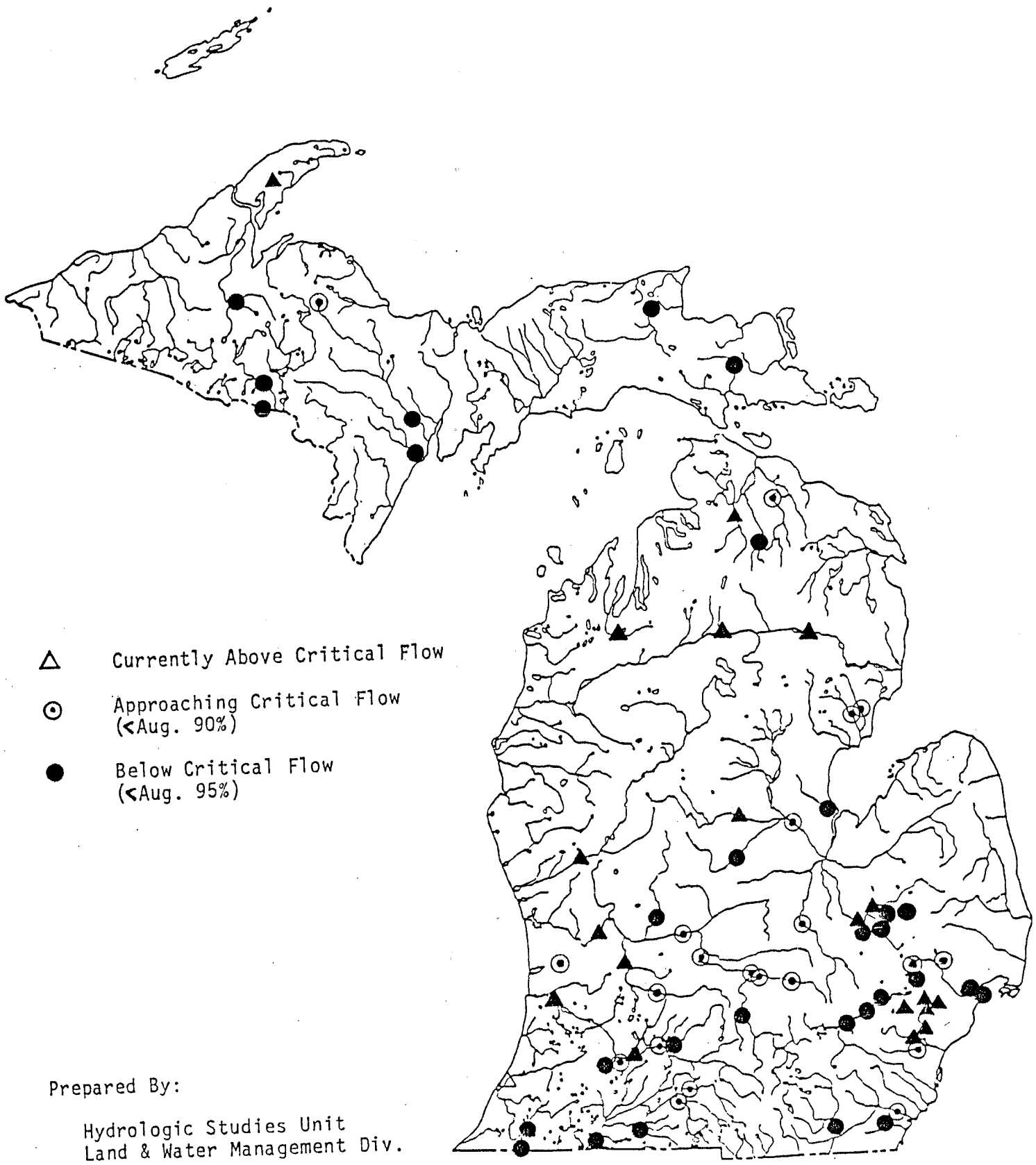
RESOURCE ASSESSMENT

Streamflows: Michigan is currently experiencing its most severe drought since the mid-1960's. Drought conditions have depleted soil moisture and reduced streamflows and lake levels. The above normal temperatures are further stressing plants and animals and have raised water temperatures. Streamflows in the state can be characterized as extremely dry for July and are dropping rapidly (See figure 1). Flows for a number of streams have reached the 95% exceedance flow for August. As flows drop below this rate, which is used to design wastewater treatment plants, state water quality standards may not be met.

The River Raisin in southeast Michigan serves as an example of a watershed where drought conditions and multiple water withdrawals have resulted in extremely low streamflows. Small tributaries in the headwaters of the River Raisin are maintaining adequate flows. However, streamflow at Manchester, which represents a drainage area of 132 square miles, was virtually nonexistent in early July. Further downstream, flows have been

Figure 1

STREAMFLOW CONDITIONS



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reduced to the point where the public water supply systems for Blissfield, Deerfield, and Dundee face potential shortages.

A number of dams in the state are also impacting streamflows during the drought. Streams currently experiencing fluctuations of potential concern include the Kalamazoo River downstream of Marshall; Grand River; St. Joseph River downstream of Mottville; Tittabawassee River; Ore Creek in Livingston County; Pine River downstream of St. Louis; and Paint Creek in Oakland County. Stream reaches subject to flow regulation are identified in figure 2.

Groundwater: Groundwater levels generally reflect long-term precipitation, evapotranspiration, recharge, and water withdrawals. Little information is currently available regarding localized groundwater conditions in Michigan during the drought. However, six U.S. Geological Survey observation wells located around the state indicate groundwater declines of 1-2 feet. Among the cities that rely on groundwater for public water supply are Lansing, Kalamazoo, Battle Creek, and Jackson.

Great Lakes: Lower than normal precipitation over the past several years has resulted in significant declines in the Great Lakes. Lakes Michigan and Huron have declined nearly three feet from the century high water levels of October, 1986 (See Figure 3). The Great Lakes are continuing to decline during the present drought, with little reliable indication of how low water levels will eventually fall.

Although the Great Lakes contain one-fifth of the world's supply of fresh surface water, only about one percent is renewable annually through precipitation. According to a study sponsored by the International Joint Commission, any reduction in water supplies will have greater impacts than absolute water quantities might suggest. These impacts will be experienced throughout the Great Lakes system. They include reduced fisheries and wildlife habitat, increased costs for power generation and public water supply, decreased commercial shipping, and impaired recreation boating.

Figure 2

STREAMFLOWS ALTERED BY DAMS

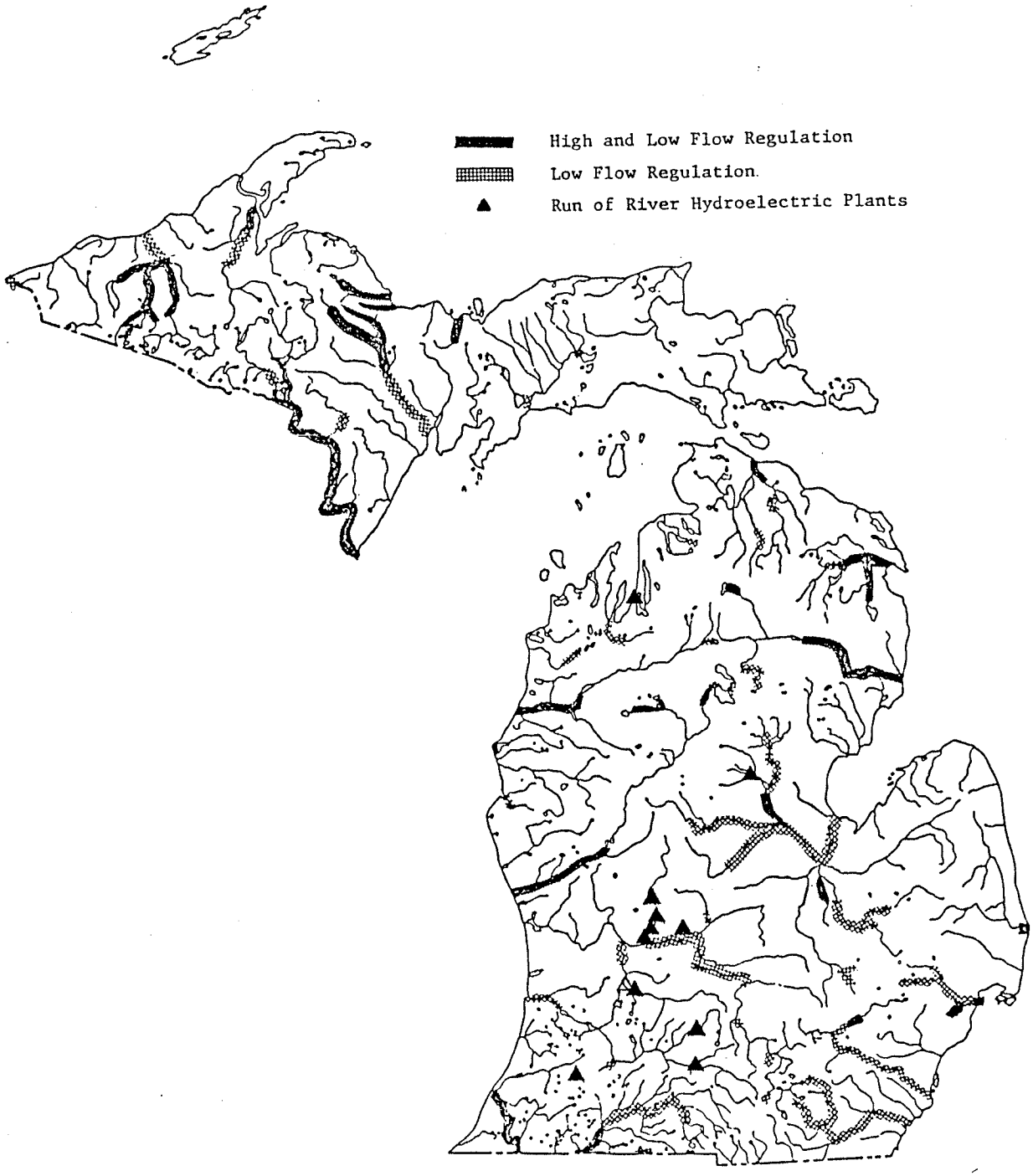

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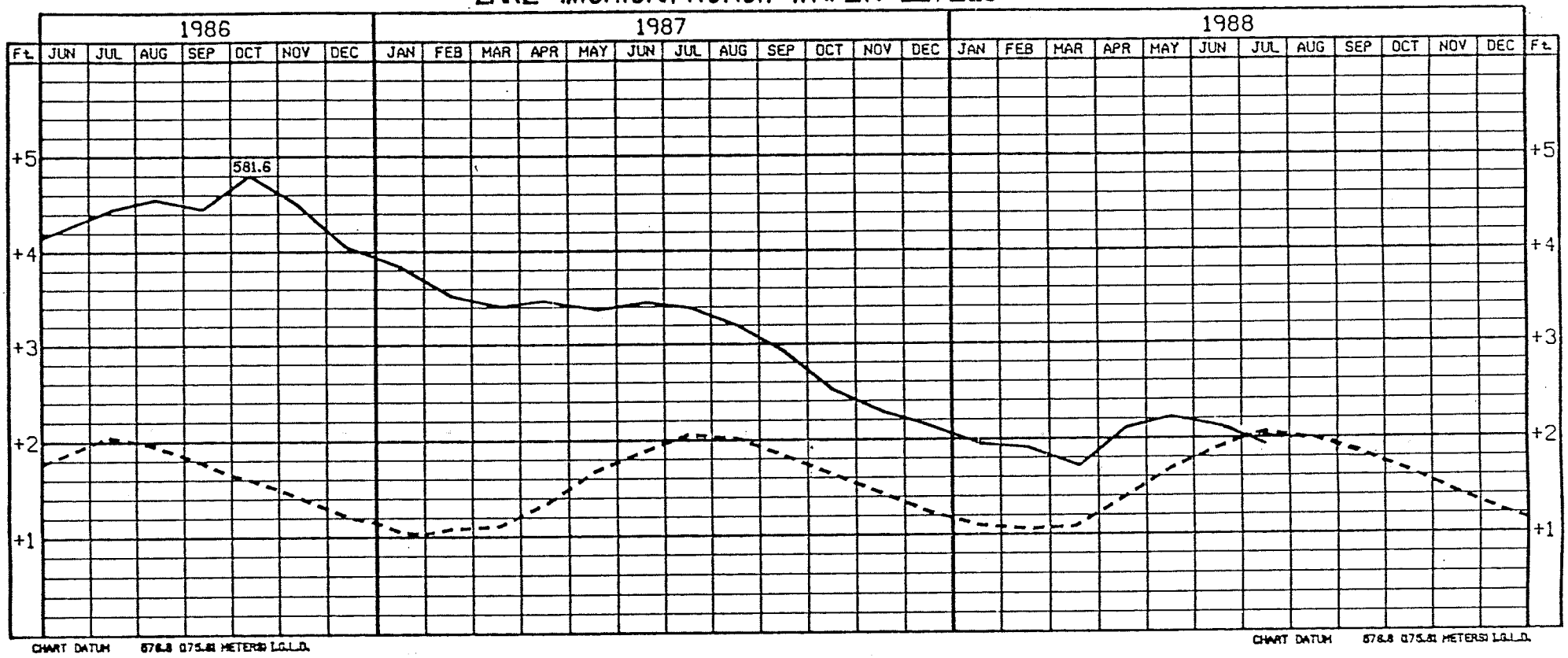
Figure 3

LAKE MICHIGAN-HURON WATER LEVELS



SOURCE: US Army Corps of Engineers
Monthly Bulletin of Lake Levels
for the Great Lakes

LEGEND

——— RECORDED WATER LEVELS
— — — PROJECTED WATER LEVELS
- - - - - LONG TERM AVERAGES

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Water Use Conflicts: The majority of water use conflicts occurring during the present drought involve inland lakes, streams, and groundwater rather than the Great Lakes. During the past 10 years, 70% of the water use complaints reported to the Department occurred between irrigation and other uses. Over 80% of these conflicts resulted from water withdrawn from surface water resources, although groundwater conflicts are increasing. Other reported water use complaints are for oil and gas well drilling, gravel operations, and public supply systems.

If the current drought conditions persist and irrigation withdrawals continue, conflicts between water users will increase significantly. The likely result will be law suits between riparians and simultaneous calls for the Department to protect water resources at some minimum level. If drought conditions become severe and the minimum streamflows necessary to sustain biological organisms are not maintained, long-term damage to water resources may occur.

Water Quality: Discharges to Michigan waters are regulated by NPDES permits to ensure that water quality standards are met in receiving water bodies. With many streams already at the critical low flows used to design wastewater plants - with flows still falling - violations of water quality standards may occur. This can result in fish kills and other resource problems. During the extended dry period, materials are also collecting in storm sewers, catch basins, combined sewers, and on streets. A storm event of sufficient size will flush this material out to receiving streams. Since these streams are already stressed by low flows and high temperatures, significant adverse effects may occur.

In urbanized areas, the primary stormwater-related concern will be the discharge of organic materials from storm sewers and combined storm and sanitary sewers. The oxygen-consuming effect of these materials, measured in terms of biochemical oxygen demand (BOD), reduces oxygen levels in streams. During droughts, when dissolved oxygen levels in streams are already low, these discharges can result in significant fish kills. Inorganic solids flushed into streams during storm events also represent a threat to fish.

Fisheries: The impacts of drought on fish populations will vary considerably from stream to stream, depending on stream characteristics. Generally, impacts fall into three categories: 1) acute mortalities due to dissolved oxygen or temperature problems, 2) gradual changes in fish abundance over the season, 3) changes in fish community composition in larger trout streams, and 4) loss of fish food organisms.

Acute mortalities observed as fish kills may occur in a number of circumstances, but the most likely location is below a wastewater discharge point which has been permitted based on low flow assumptions which were not as extreme as conditions occurring this year. These fish kills will generally be reported through the Pollution Emergency Alert System (PEAS). No preventive actions can be taken in most of these cases, and full recovery is likely to take two or three years. If required, the wastewater discharger or the Department may restock fish into an affected area.

As a general rule, the population of fish which will survive the summer will be proportional to stream low flow during the season. For example, if stream low flow is 50 percent of the normal low flow, then the surviving fish population at the end of the year will be approximately 50 percent of the normal population. Most fish populations in streams will rebound within 2-3 years after the return to normal water conditions. No preventive actions are feasible to reduce these gradual effects. Immediate restoration is generally infeasible but may be possible in some circumstances.

In the case of marginal trout streams, trout will typically be replaced by suckers or other less desirable fishes. The stream will not return to its previous conditions without management intervention to reduce competing species and restock trout. The Department will assess the status of marginal trout streams and undertake rehabilitative measures if qualitative indications of such problems are identified.

Lastly, drought conditions may result in the loss of fish food organisms such as minnows, crayfish, and other smaller crustaceans and insects as a

result of habitat reduction and adverse physical and chemical conditions. Under these conditions, fish are unable to build and store fat reserves for winter survival and/or to complete reproductive cycles.

Wildlife: The drought will have three major impacts on wildlife in the state as water levels decline in streams, lakes, wildlife flooding areas, and wetland management areas. The first is the risk of disease and predatory losses as wildlife concentrate around drinking water sources. Secondly, the lack of vegetation, nuts, and berries will make wildlife more susceptible to a severe winter. Lastly, pheasant restoration efforts may be seriously impacted since agricultural lands set aside for the Conservation Reserve Program are now allowed to be harvested.

Forests: Dry conditions have increased both the risk of wildfires occurring and of their rapidly growing to unmanageable size. The long-term drought has depleted ground moisture and lowered water tables. Forest fuels are also low in moisture content. The result is a significant threat statewide to resource values, developed property, and human life. The threat is greatest where especially flammable forest types and an increasing amount of dispersed human settlement occur on a large scale, such as the Lake Huron side of the Lower Peninsula and in the central Upper Peninsula. Special risks are associated with muck or organic soil wildfires, which are very difficult to extinguish.

Other problems involving water supply and seedling plantings will occur as a result of the drought. The Manistique River is used for irrigating several million tree seedlings at the State Forest Nursery. Lack of rain has now reduced the river water level below the intake for the irrigation system. Two to three years of future reforestation plantings valued at about $750,000 are at considerable risk. Seedlings planted this spring will also be severely stressed and mortality is expected to be extremely high. Nearly three million trees were planted, and a mortality of 40-50% is expected.

Lack of moisture is also limiting tree growth. As much as 50% of the potential growth in many species may be lost during the current drought.

In addition, trees are more susceptible to insects and disease, which further impact growth and can eventually cause some mortality. This will affect timber availability and may reduce future revenues.

Recreation: The rapid change from high water conditions on the Great Lakes to lower water levels has significantly impacted recreation programs. During the high water period, the Department constructed sea walls, raised parking lots and docks, and moved utilities out of the water. Dredging activities were postponed or halted because water depths were increasing.

Lower water levels associated with the drought have changed the maintenance problems that the Department encounters. Silt buildups at launching ramps and in slips have caused significant difficulties for boaters. This creates conditions where damage occurs to unusable facilities and boats. If the drought is sustained, local units will be requesting assistance for harbor dredging. Major dredging will be required within the next year or many facilities will be unusable. There are difficulties in responding to rapidly changing conditions because of the time requirements for budget approvals, permits, and construction award procedures.

During the drought a significant increase in hot weather recreational demand has underlined the need for additional facilities and public access to water. Delays are occurring at boat launching ramps, more people want to swim, and sites are jammed beyond capacity. This increases needs for trash removal, user control personnel, toilet cleanup, and general maintenance. Lawns and plants may need replacement to keep up site appearance. Dust control is a major problem.

Parks: Extended hot and dry weather results in increased park use by day users and campers. This could result in problems with water supply and sewage disposal. Department impoundments operated for recreation purposes may have difficulty maintaining minimum outflows while providing adequate water levels for recreation. Low water levels experienced during the

drought may also affect water quality at public beaches. Some shallow swimming areas with drop-offs may become hazardous.

SHORT-TERM ACTIONS

1. Recommended Action

An interdepartmental drought response management task force will be formed to coordinate short-term and long-term strategies for dealing with drought conditions in Michigan. This effort will be coordinated by the Office of Water Resources.

Rationale

There are over 60 water management programs at the state level in the Departments of Natural Resources, Agriculture, Attorney General, Commerce, and Public Health. The emphasis of these programs varies from agricultural and industrial development to water resources protection. However, nearly all are affected to some degree by the current drought. To respond to diverse drought problems, the state needs to coordinate short-term and long-term drought response strategies. Acting jointly will maximize efficient use of limited state resources and minimize conflicting management actions. It will also establish a basis for future cooperation in managing key water management issues.

Expected Outcome

A short-term drought response strategy coordinated by the Departments of Natural Resources, Agriculture, Attorney General, Commerce, and Public Health will identify specific actions to best conserve, protect, and equitably use water resources during the drought emergency. A coordinated long-term strategy will enable the state to address fundamental legal and

policy issues such as the effectiveness of common law riparian doctrine, minimum instream flow protection, and water quality standards.

2. Recommended Action

Periodic information meetings will be held by the Office of Water Resources summarizing statewide drought conditions, the status of water resources, and water use conflicts.

Rationale

Resource management decisions made during the current drought will require accurate and regularly updated information. There is a need for managers in the Department to anticipate actions that can be taken in their programs. Since different programs impact the same water resources, it is important that managers be acting in a coordinated manner from a consistent information base. This will also provide a basis for giving accurate information to the numerous requests from the public and media. Periodic meetings open to division chiefs will be used to summarize statewide drought conditions, assess water resources and related fisheries and wildlife issues, and identify areas of water use conflicts.

Expected Outcome

It is expected that drought related decision-making will be more responsive and consistent when regularly updated drought information is provided to division managers. Accurate information will also be more readily available to the public and media.

3. Recommended Action

The Attorney General's Office will be requested to clarify specific questions on Michigan water rights to identify what statutory and common law authorities the Department can use to regulate water withdrawals from surface water resources and groundwater.

Rationale

Withdrawals for major water uses in the state have increased steadily over the past two decades. As a result of these withdrawals, larger consumptive water losses, and expanded instream uses for recreation, hydroelectric power generation, and fisheries, water resources are subject to heavy water user demands. During the current drought, conflicts have significantly increased. The Department's authority to resolve water rights disputes under the Inland Lakes and Stream Act is disputed both within the Department and among outside agencies. In addition, it is unclear how common law riparian rights apply to surface water resources versus groundwater. There is a clear need for a clarification of these specific water rights issues by the Attorney General's Office.

Expected Outcome

Identifying the Department's statutory authority to regulate water withdrawals will determine what actions the Department can take to resolve water use conflicts. Clarification of common law water rights in Michigan will enable departmental staff to advise citizens of their water rights and of reasonable use restrictions. This is expected to reduce nonriparian use of water resources.

4. Recommended Action

The Office of the Great Lakes will oppose new or increased diversions out of the Great Lakes Basin using all available options.

Rationale

Diversions of water out of the Great Lakes Basin constitute an unacceptable risk to the Great Lakes ecosystem and the health and welfare of basin populations. During the past two years, Lakes Michigan and Huron have declined nearly three feet and are now below their long-term average levels. There is no reliable estimate of how much further they will decline. Diversion outside the basin is contrary to the concepts of the

Great Lakes Charter and would create an unalterable dependency on Great Lakes water by out-of-basin users. Michigan should continue to pursue the most restrictive feasible state legislation on diversions while working jointly with other Great Lakes states and Canadian provinces. To better assess future water needs within the basin, the state should develop reliable information on the impacts of existing diversions and consumptive uses, lake level fluctuations, and projected water uses.

Expected Outcome

Opposition to new or increased Great Lakes diversions will ensure that Michigan and the other Great Lakes states and Canadian provinces have adequate water supplies in the future. These supplies are necessary for fisheries and wildlife habitat, public water supply, power generation, commercial shipping, and recreational uses.

5. Recommended Action

The Office of Water Resources will develop briefing materials for state legislators outlining the short-term actions recommended in the drought response strategy.

Rationale

Legislators are receiving numerous requests during the current drought from constituents and the media who want to know what actions state government can take to insure adequate water supplies, resolve water conflicts, and protect instream uses. As partners in the water management process, legislators should clearly understand the short-term recommendations in any drought response strategy developed by state departments. Legislative offices also serve as effective conduits for reaching the public. They should therefore be provided with briefing materials outlining the proposed state drought response strategy, the need for local water conservation measures in targeted watersheds, and the public benefits that can be expected.

Expected Outcome

Briefing materials are expected to provide legislators with information that will assist them in responding to constituent and media inquiries. Materials for water conservation can also be distributed by legislative offices directly to water users at the local level.

6. Recommended Action

Water conservation actions emphasizing demand management should be jointly supported by the Departments of Natural Resources, Agriculture, Commerce, and Public Health. State information and technical assistance should be provided to support local water conservation programs. This should facilitate the preparation and distribution of educational materials and conservation recommendations by the Cooperative Extension Service, regional planning agencies, county and municipal associations, and other key networks. These efforts should be focused in particular on targeted watersheds with significant use conflicts, low streamflows and groundwater levels, or water distribution problems. State facilities in these areas should implement water conservation measures.

Rationale

The mission of the Department of Natural Resources, as stated in the State Constitution, is "the conservation and development of the Natural Resources of the state." Several watersheds in the state are experiencing drought-related water shortages and conflicts as a result of reduced streamflows, lake levels, or groundwater. They include the River Raisin, St. Joseph, Flat, Fish Creek, and Saginaw. To minimize harmful impacts to fisheries and wildlife and to protect water quality, overall water use should be reduced in these areas. Data from other states indicate that water conservation measures, if widely practiced, can reduce public water demands by 20% or more. Local conservation programs jointly supported by the Departments of Natural Resources, Agriculture, Commerce, and Public Health would effectively reach all major water use groups in targeted watersheds. During a time when public attention is focused on negative

drought consequences, this would present positive alternatives to preserve and wisely use water resources.

Expected Outcome

Conservation measures, if widely practiced, are expected to reduce water demands in watersheds where conflicts and shortages are occurring. This will not resolve all drought problems, but it can provide a temporary buffer to help water users through short-term emergencies. It can also provide an added measure of protection for instream water uses.

7. Recommended Action

The Director will request the Federal Energy Regulatory Commission (FERC) to contact all dam owners under license and remind them of their responsibility to maintain minimum flow releases during the drought. The Land and Water Management Division will request counties to operate lake level control structures to maintain minimum flow releases where it is feasible. Dam owners not regulated or dams not used for lake level control will be contacted and requested to operate their dams in a run-of-the-river mode (i.e. inflow equals outflow) during the drought period.

Rationale

Streamflows, water quality, and fisheries are influenced by the operation of approximately 2,200 dams and impoundments in the state. During drought conditions, significant impacts can occur when already low natural flows are restricted to maintain water levels behind the structures. Short-term streamflow fluctuations associated with dam releases can also cause harmful impacts. Approximately 80 hydroelectric dams are licensed by the Federal Energy Regulatory Commission. Notifying the owners of these dams of the importance of maintaining minimum flow releases during the drought will encourage them to take actions to reduce harmful impacts. The remaining dam owners can be contacted by individual letter and through a general press release to advise them of recommended operating procedures.

Expected Outcome

Advising dam owners of recommended operating procedures during drought conditions is expected to result in more stable streamflows and fewer negative impacts to water quality and fisheries downstream of dams. In most instances, the actions taken would be voluntary, since the Department does not have direct authority to mandate operating procedures.

8. Recommended Action

The Surface Water Quality Division will request the cooperation of NPDES permit holders to reduce pollutant loads to streams to minimize wastewater generation, maximize the efficiency of the waste treatment, and reschedule planned maintenance during less critical times.

Rationale

There are over 1,400 wastewater discharges in the state permitted by the Department under the National Pollution Discharge Elimination System (NPDES). With streamflows dropping below the design flows used to set NPDES permit limits, water quality standards may not be met. The Department can require NPDES permit holders to meet specified limits in their permits. However, many facilities have the capability of reducing pollutant loads beyond what is required in their permit.

Expected Outcome

Voluntary cooperation of NPDES permit holders will reduce the pollutant waste discharge flow and lessen the probability of fish kills and other negative impacts to stream aquatic life.

9. Recommended Action

The Surface Water Quality Division will provide technical assistance and encourage local governments to clean storm sewers, catch basins, and combined sewers.

Rationale

During extended dry periods, materials collect in storm sewers, catch basins, and combined sewers. A storm event will flush these materials into receiving streams which are stressed by low flows and high temperatures. Sewer cleaning may not be practical in some communities when water restrictions are in place, since it requires flushing water. However, local governments should take whatever actions that are feasible to protect water quality as the drought continues.

Expected Outcome

Cleaning of storm sewers, catch basins, and combined sewers will reduce pollution loading to streams during storm events. This will minimize water quality degradation and negative impacts to stream aquatic life.

10. Recommended Action

The Forest Management Division will continue to carry out fire protection measures under the Emergency Fire Proclamation issued by Governor Blanchard.

Rationale

Drought conditions have resulted in extremely high wildfire hazards throughout the state. Hazards are particularly great in the eastern Lower Peninsula and the central Upper Peninsula. In response to this danger, Governor James Blanchard issued a statewide Emergency Fire Proclamation on June 22. The proclamation prohibits campfires; pipe, cigar, and cigarette smoking; burning of flammable material; and the use of fireworks except in approved areas. Since the order remains in full effect until revoked by the Governor, it is imperative that the Department give a high priority to carrying out emergency fire protection measures.

Expected Outcome

Implementation of emergency fire protection measures under Governor Blanchard's proclamation is expected to reduce wildfire dangers throughout Michigan. This will protect human life and forest resources, while preserving water supplies that otherwise might have been used for fighting fires.

11. Recommended Action

The Office of Water Resources will provide regional and district offices and conservation officers with a summary of water rights under common law riparian doctrine and current statutory authorities to assist them in potential enforcement actions.

Rationale

Regional and district office personnel receive frequent requests to investigate water conflicts, unauthorized construction activities, and fish and wildlife impacts during drought conditions. Some of these activities are regulated under statutory authority granted to the Department. Others fall under the jurisdiction of common law. Since water rights are often unclear to Department employees, they are at times unable to effectively respond to water use conflicts or answer citizen inquires. In some instances, this has resulted in the Department giving incomplete or conflicting information which has compounded water management problems. During the current drought, it is essential that accurate information about water rights be provided to the public.

Expected Outcome

Providing Department personnel with a clear understanding of common law water rights and related statutory authorities will assist them in responding to citizen requests regarding water use conflicts. This will lessen confusion over the Department's enforcement responsibilities and

enable field staff to use their time more efficiently investigating matters where the Department has clear statutory authority.

12. Recommended Action

The Land and Water Management Division will monitor streamflow conditions throughout the state during the drought and correlate the data with long-term stream gaging records.

Rationale

Current data on streamflows, when compared to long-term data from gaging stations, will enable the Department to assess the severity of droughts. This information helps identify areas where streamflows are lowest, and therefore when negative impacts to water and related resources are most likely to occur. In addition to being valuable for short-term assessment, additional data will benefit long-term management. Of particular importance is the design and operation of wastewater treatment plants, where streamflows are a critical factor in setting effluent limits. The existing streamflow data network is often inadequate for these decisions or to make assessments regarding the availability of water resources.

Expected Outcome

Information collected and analyzed during the current drought will be used for the future design and operation of water management facilities. It will allow for improved management of water resources based on factual information.

13. Recommended Action

The Surface Water Quality Division will monitor water quality conditions in lakes and streams to determine the effects of the drought on biological organisms, fish, and other aquatic life.

Rationale

Effluent limits are set for wastewater treatment plants based on stream modeling and a number of assumptions about how stream systems operate during drought conditions. Collection of data during droughts will enable the Department to verify these assumptions and better prepare future NPDES permits. In other cases, information is used to document assumptions made by the Department in situations where effluent limits are being contested in the courts. The Environmental Protection Agency has required the Department to develop a list of stream segments where water quality does not meet the standards for designated uses. This list is based on a number of assumptions which could be difficult to document. Since the list will be used to prioritize water quality management efforts in the future, it is important that as much factual information be available as possible. These assessments are most easily conducted during drought conditions, when water quality problems and stream impacts are most apparent.

Expected Outcome

Collection of water quality data during drought conditions will provide factual information for facilities design and management assessments to allow for the most efficient use of limited financial resources to improve water quality in Michigan.

14. Recommended Action

The Office of Water Resources will respond to all water use complaints reported to the Department and request field staff to investigate those complaints involving possible statutory violations.

Rationale

The occurrence of water use conflicts is often the first indication that instream uses for recreation, fisheries, and wildlife are threatened or that water supply shortages may occur. During the present drought, water use conflicts have significantly increased, with numerous requests by citizens and legislators for information and assistance from the

Department. Watersheds with increased conflicts include the River Raisin, St. Joseph, Flat, Fish Creek, and Saginaw. Although the Department does not have the clear legal authority to resolve most water use conflicts, it does have a responsibility to determine if water resources are threatened by increased withdrawals and consumptive losses. In addition, water complaints often help identify violations of the Inland Lakes and Streams Act and the Wetland Protection Act. Lastly, there is a need to provide assistance in explaining common law water rights to water users and to prepare assessments for the Legislature on the effectiveness of common law riparian doctrine in protecting the water resources in the state.

Expected Outcome

Documenting and responding to water use conflicts will enable the Department to identify water resources which are subject to high demand and/or threatened by overuse. It will help the Department to prevent violations of the Inland Lakes and Streams Act and the Wetland Protection Act. Citizens will be better informed regarding water rights, thereby reducing nonriparian water withdrawals. Lastly, it will be possible to assess the effectiveness of common law riparian doctrine in governing the use of water resources in the state.

15. Recommended Action

The Recreation Division will notify staff that nonriparian water withdrawals from public access sites are prohibited under common law.

Rationale

Public access sites are being used by nonriparians to withdraw water from lakes and streams. This is a clear violation of common law. In order to ensure that lake and instream water uses such as recreation, fisheries, and wildlife habitat are protected during the drought, nonriparian water withdrawals should not be allowed.

Expected Outcome

Prevention of nonriparian water withdrawals from public access sites maintained by the Department will protect lakes and instream uses during the drought. Although these withdrawals are intermittent, negative impacts to the resource could result.

16. Recommended Action

The Parks Division will post locations at state park beaches where drop-offs pose a hazard. The Division will also work with public health departments to identify areas where reduced flows and water levels may be causing water quality problems.

Rationale

Reduced water levels in lakes increase the possibility that people may stray into areas with steep drop-offs. Posted signs identifying this risk will encourage safety in swimming areas. Drought conditions may also lower water quality, which could affect recreational uses. Field staff should therefore work with local health departments to identify any area where public use restrictions may need to be put into effect.

Expected Outcome

Measures to protect recreational users and identify water quality problems will result in improved public health conditions at department facilities.

17. Recommended Action

The Waste Management Division will review, and where appropriate, authorize the use of partially treated wastewater for irrigation of crops.

Rationale

During the drought, many streams in the state that receive wastewater discharges are at low levels. At the same time, demands for irrigation withdrawals have increased. A number of small communities store partially

treated wastewater for discharge in the fall when temperatures are lower. The Water Resources Commission has authorized the Waste Management Division to approve the use of this water to irrigate crops. This will reduce wastewater discharges at the same time that it increases irrigation water supplies. Review on a case by case basis by the Waste Management Division and the Department of Agriculture would ensure that individual circumstances are considered.

Expected Outcome

The use of wastewater for irrigation during the drought will benefit crop production. At the same time, it will reduce the need to discharge wastewater into receiving waters.

18. Recommended Action

Divisions within the Department will document any drought-related expenses that may be accumulated for possible federal reimbursement.

Rationale

Although federal agencies have limited emergency procedures to deal with the drought, it is possible that federal aid will be available if a "drought emergency" disaster is declared by the President. If that occurs, work needed to mitigate drought losses could be approved within existing grant programs. A significant limitation is that the Department is three quarters of the way through the fiscal year, and most existing grants are earned. However, additional funds might be made available. It is important that Divisions keep good records of money and/or efforts expended because of drought conditions. These records will enable the Department to apply for drought relief funds and be reimbursed if they become available in the future.

Expected Outcome

Documentation of drought-related expenses by the Department will increase the likelihood of federal reimbursement if a "drought emergency" disaster is declared by the President.

RECOMMENDED LONG-TERM ACTIONS

Long-term actions to address drought conditions are outlined in the State Water Management Plan, Water Resources for the Future: Michigan's Action Plan, which was developed by the Great Lakes and Water Resources Planning Commission. The following excerpts from the plan are presented here for public discussion:

Watershed Management

The watershed has long been advocated as the logical unit for comprehensive water planning and management in Michigan. The Great Lakes and Water Resources Planning Commission recognized the need for watershed management as a central theme in many of the resource issues that were examined. Since watershed boundaries do not correspond to political boundaries, it has been difficult to implement watershed management programs in the state. Significant progress will result if future planning efforts are focused on critical watersheds.

In Michigan, there are 50 major watersheds that drain into the Great Lakes. Each watershed is defined as the entire land area contributing to runoff and sustaining flow in a stream and its tributaries. A watershed actually includes two hydrologic systems, surface water and groundwater. These systems are often interconnected but may not be identical in size or nature. In some cases, deeper groundwater aquifers extend beyond an area larger than an individual watershed. Such an aquifer may need to be considered as a separate unit for management. However, the watershed approach is the most effective means of managing water and related land resources, surface and ground water, and water quality and quantity. Implementation will need to be carried out on a critical watershed basis. A critical watershed is defined as a major watershed with significant water resources problems or opportunities where comprehensive planning will provide a basis for coordinated water resources management.

Watershed management will provide a more comprehensive basis for protecting and developing surface water and groundwater resources in critical watersheds. It will enable managers to move beyond a piecemeal approach to consider multiple factors within the entire watershed. Management will be more closely aligned with the natural watershed system. This will support the equitable use of water for public water supply, agriculture, industry, wastewater treatment, and recreation. As water management measures are implemented, water quality and availability will improve.

Recommendation 1

Michigan should adopt watershed planning and management as basic principles of state water policy and implement programs on a critical watershed basis.

Actions Required

1. The state office of water resources should develop policies, guidelines, and criteria for critical watershed planning in Michigan by October, 1988. This process should include input from state departments, substate entities, local governments, and public and private interest groups. At least one critical watershed should be designated and funding secured for critical watershed planning by December, 1988.

2. The Michigan Departments of Natural Resources, Agriculture, and Public Health should restructure their water programs to implement management measures on a watershed basis by December, 1989.

Competing Water Uses and Rights

Management Alternatives

As conflicts over the use of inland surface water and groundwater increase, the level of water resources management should be periodically reevaluated. Four management alternatives have been developed for consideration by the Commission. Each level is increasingly stringent.

The first level of management is the existing system of Riparian Common Law, where riparian landowners are entitled to a reasonable use of riparian water. Water use conflicts between private users or between private and public interests are resolved by the civil courts, which determine whether a water use is reasonable based on criteria set forth in prior cases.

The second level of management, Water Use Reporting, requires statewide documentation of all water withdrawals above a minimum level as a basis for identifying existing water demands within given watersheds or governmental jurisdictions. The information is then used to determine if supplies are adequate for users and the protection of the resource.

The third level of management is the Protection of Minimum Instream Flows. This approach provides some degree of administrative management without directly allocating surplus waters. Instream uses are protected by preventing surface water withdrawals below a defined level. Withdrawals from interconnected groundwater aquifers that reduce streamflows below minimum levels are prohibited. Streamflows above minimum levels are available to users under the provisions of the riparian doctrine.

The fourth level of management is Water Use Regulation through a permit system. In most cases, standards are first established to protect the resource at some minimum level. The quantity of water available above this level is then allocated by issuing permits to water users. Regulations may be imposed statewide or only in critical watershed areas where there are extensive water withdrawals or limited resources.

Effective management of the water resources in Michigan requires accurate, timely information on existing water uses. By requiring water users in the state to report significant water withdrawals annually, a comprehensive data base will be established for planners, managers, and users. This will facilitate the adoption of conservation and demand management techniques, the development of additional water resources where feasible, or the restriction of further water withdrawals when instream uses are severely threatened.

Recommendation I

Mandatory statewide water use reporting should be required annually to document all significant water withdrawals by agriculture, industry, and power generation from all water sources. Public water supply reporting as required under present state law should be continued.

Action Required

1. The state office of water resources, with input from the Michigan Departments of Agriculture, Attorney General, Commerce, and Natural Resources, should draft legislation by March, 1988 to require agricultural, industrial, and power generation water use reporting.

An increased level of water resources management is required in critical watershed areas where serious water use conflicts exist. The purposes of protecting instream flows at some minimum level are to provide a minimum quantity of water to support fish, wildlife, and plant communities and water-based recreation activities; assure adequate flows for wastewater discharges; and preserve a degree of the aesthetic values of inland water resources. A feasibility study in a critical watershed will enable potential water supply and resource protection problems to be carefully examined before a crisis develops. Because a divergence of opinions is likely regarding how water should be used, all technical, social, and political issues should be considered in the feasibility study.

Recommendation II

Minimum instream flows should be protected in critical watersheds in the state to protect instream water uses at some defined level.

Actions Required

1. The Michigan Department of Natural Resources, with input from the Departments of Agriculture, Attorney General, Commerce, Public Health and public and private interest groups, should develop a process by December, 1988 for establishing minimum instream flows in designated critical watersheds.

2. The Michigan Department of Natural Resources, with input from the Departments of Agriculture, Attorney General, Commerce, and Public Health, should draft legislation to protect minimum instream flows in designated critical watersheds by December, 1989.

3. The Michigan Department of Natural Resources, with input from the Departments of Agriculture, Attorney General, Commerce, and Public Health, should complete a study by December, 1990 to determine the feasibility of adopting a water allocation system to manage water resources in a critical watershed in the state.

Inland surface water and groundwater resources have been substantially developed in Michigan. As water demands increase, the emphasis in the state is likely to shift from water supply development to water management in order to utilize limited water resources. However, a number of water development options exist. They should continue to be an important aspect of water management in the state.

Recommendation III

Where feasible, new water sources should be developed to ensure adequate water supplies for industrial, power generation, and agricultural users. The present applicability of the Severance Rule should be evaluated.

Actions Required

1. The Michigan Department of Agriculture, with input from the Departments of Attorney General, Commerce, Natural Resources, and Public Health, should evaluate the extent of riparian land in the state adversely affected by the Severance Rule by December, 1988.

2. The Michigan Department of Agriculture, with input from the Department of Attorney General, Commerce, Natural Resources, and Public Health, should draft legislation to rewrite the existing Irrigation Districts Act, Public Act 205 of 1967, as amended, by December, 1988.

Water conservation and demand management techniques should be an integral component of programs to manage inland surface water and groundwater. These measures can reduce the need for water while using the remaining supplies more efficiently. Their adoption in critical watersheds is particularly important to ensure effective management of limited water resources. However, water conservation and demand management techniques will benefit all water users in the state, since they produce economic savings while protecting water resources.

Recommendation IV

Water conservation and demand management techniques should be encouraged throughout the state, with particular emphasis on their adoption in critical watersheds.

Action Required

1. The Michigan Department of Natural Resources, with input from the Departments of Agriculture, Commerce, and Public Health, should identify water conservation and demand management techniques by October, 1988 to be implemented in designated critical watersheds.

Other Resource Issues

Studies indicate that the application of wastewater sludge to forest land results in improved growth with minimal impacts to groundwater quality. In addition to conditioning soil with sludge materials, partially treated wastewater can further support forest growth. Wastewater applications could be particularly useful during drought conditions. If properly applied, wastewater could help preserve critical water supplies while providing irrigation water for forest seedlings.

Recommendation 1

The use of wastewater and sludge for irrigation and nutrient enrichment should be increased on state forest lands.

Action Required

1. The Michigan Department of Natural Resources should identify appropriate forest lands where wastewater and sludge applications are feasible and conduct demonstration projects to determine their effectiveness.