

MICHIGAN WETLAND MITIGATION

AND

PERMIT COMPLIANCE STUDY

FINAL REPORT

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EXECUTIVE SUMMARY

In 1997 the MDEQ initiated a study to examine and evaluate the quality and success of wetland mitigation projects in Michigan. The study was funded by a grant from the USEPA. The primary goal of the study was to improve the quality of mitigation wetlands by identifying wetland designs and construction methods that consistently resulted in the creation of high quality wetlands. Secondary goals of the study were to compile historic data on mitigation projects, and conduct a comprehensive review and evaluation of the MDEQ's wetland mitigation program. The study examined wetland permits issued by the MDEQ between 1987 and 1998, and included projects from all geographic regions of the State.

A total of 78 permits were investigated during this study. Of the projects evaluated, 54 (70%) were from the southern half of the Lower Peninsula, while 12 (15%) of the projects were selected from both the northern half of the Lower Peninsula and the Upper Peninsula. Projects involving the creation of at least one acre of replacement wetland, established for a minimum of two complete growing seasons were preferred and selected if available.

The evaluation for each project consisted of a review of the entire MDEQ file, a detailed review of the MDEQ permit document, and inspection of all mitigation sites associated with the permit. Each permit document was reviewed and evaluated to determine if all of the necessary mitigation specific conditions had been included. The file review was used to verify whether pertinent documents (i.e., mitigation plan, conservation easement, monitoring reports, etc.) were submitted by the permittee as required. Inspections of all mitigation sites were conducted to verify that the replacement wetlands had been constructed as required and to determine whether they had adequately replaced the wetlands lost due to the original project.

A total of 159 mitigation sites were inspected. Each mitigation project was rated in the following three categories. 1) "Legal rating," had the permittee complied with all permit conditions, 2) "biological rating," had the applicant successfully created wetlands as required, and 3) "Overall rating," consisting of a combination of the legal and biological ratings. Each project was also given a "quality rating," a score from zero to ten that reflected the quality of the created wetland. A score of zero was given if the mitigation was never constructed; ten represented the best score possible.

The study revealed that the sophistication of the MDEQ wetland permits varies greatly throughout the State. The study also revealed that of the 159 sites investigated: 1) Six of every 7 mitigation projects (85%) was constructed, 2) 50% of the sites contained the required wetland acreage, 3) 42% of sites had excessive open water, 4) 32% of the sites had insufficient water, 5) 41% of mitigation sites did not contain sufficient topsoil to facilitate plant growth, 6) only 18% of permittees complied with all permit conditions, 7) only 29% of permittees were successful in creating the required amounts of wetlands, and 8) only 22% of the projects were determined to be overall successful. These statistics showed that the MDEQ's wetland mitigation program has not been successful in producing adequate replacement wetlands.

The study also revealed that adequate follow-up on mitigation projects after permit issuance has generally not been conducted. Only 20 out of the 77 mitigation projects evaluated (26%) received any type of follow-up from MDEQ staff after the permit was issued. Of the 20 projects receiving follow-up action, 13 projects received routine follow-up while 6 received action due to a complaint. (One project received a follow-up inspection for unspecified reasons.)

Many factors have contributed to this low success rate for wetland mitigation. The historic lack of a system for accurate record keeping on mitigation projects has prevented the MDEQ from knowing the scope of the problem. A preference for requiring on-site mitigation has led to many mitigation projects being constructed in locations not suitable for wetland creation. The past practice of issuing wetland permits prior to having a complete mitigation plan, conservation easement, or other pertinent information has resulted in large numbers of permit violations and poor quality wetlands. Poorly written or incomplete permits have made enforcement difficult. Heavy permit workloads have historically prevented staff from conducting follow-up monitoring on most mitigation projects. In addition, below average precipitation during the study period may have contributed to fewer successful mitigation projects.

The MDEQ has taken many steps to improve wetland mitigation since this study was initiated in 1997. These program improvements include new rules for conducting mitigation banking. The rules will improve wetland mitigation by providing for the establishment of replacement wetlands prior to wetland losses, by consolidating small wetland mitigation areas at a single location, and by encouraging the integration of wetland restoration or creation into watershed or ecoregion planning. A Wetland Mitigation Handbook is being developed that will describe banking procedures and technical considerations in lay terms. Administrative rules were promulgated in April 2000 to clarify and standardize wetland mitigation requirements for permitted wetland impacts. The rules allow for the restoration, creation, use of credits from a mitigation bank, and, in certain circumstances, preservation of existing wetland as wetland mitigation. On-site wetland mitigation is called for by the rule only when it is practical and beneficial to the wetland resources. The rules require a mitigation plan and outline the requirements for the plan. The mitigation plan will provide a basis for tracking compliance with mitigation requirements and for measuring the success of the mitigation. A computerized wetland mitigation tracking system was developed and is now available for all permitting staff.

To improve the wetland mitigation program, it is recommended that MDEQ:

1. Update its standard mitigation permit conditions.
2. Withhold the issuance of a wetland permit until such time that they have received, reviewed, and approved all necessary mitigation related information, or condition permits with a requirement for the submittal and approval of a mitigation plan prior to work beginning.
3. Conduct inspections of a percentage of mitigation projects and report any violations to the Compliance Tracking Database with enforcement conducted pursuant to LWMD's enforcement priorities.
4. Prioritize mitigation violations using the LWMD's priority system.
5. The MDEQ should consider the restoration of historically lost wetlands instead of allowing the creation of wetlands from upland areas where they are less likely to succeed.
6. Require that mitigation projects incorporate a water control structure where feasible and necessary so that the water level can be easily adjusted.

7. Encourage and promote wetland mitigation banking. Wetland mitigation banking is desirable because the mitigation wetlands are constructed, monitored, and certified prior to being available for use by the permit applicants.

The results of this study are similar to the results of other studies of the success of wetland mitigation. Generally, the rate of compliance with mitigation requirements in permits and the success of mitigation wetlands that are constructed have been found to be below.

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I. INTRODUCTION

A. Purpose

This study was conducted by the Land and Water Management Division (LWMD) of the Michigan Department of Environmental Quality (MDEQ) under a grant from the U.S. Environmental Protection Agency (USEPA). The primary purpose for this study was to evaluate wetland mitigation projects authorized by the MDEQ, in order to identify wetland designs and construction methods that consistently resulted in the creation of high quality “functioning” mitigation wetlands. The goal of this study was to improve the quality of mitigation wetlands constructed as part of the MDEQ’s wetland regulatory program

B. Background

Part 303, Wetlands Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, states the following in section 30304: “Except as otherwise provided by this part or by a permit obtained from the MDEQ, a person shall not do any of the following:

- (a) Deposit or permit the placing of fill material in a wetland.
- (b) Dredge, remove, or permit the removal of soil or minerals from a wetland.
- (c) Construct, operate, or maintain any use or development in a wetland.
- (d) Drain surface water from a wetland.”

The MDEQ administers Michigan’s wetland regulatory program. The state of Michigan assumed the regulatory responsibilities for Section 404 of the Clean Water Act (CWA) from the USEPA in 1984. Michigan is one of only two states to have assumed the Section 404 program. In accordance with the assumption agreement the USEPA retains veto authority over large projects that involve a minimum discharge of 10,000 cubic yards of fill within a regulated wetland. The U.S. Army Corps of Engineers (USACE) retains Section 404 jurisdiction over wetlands adjacent to the Great Lakes and major navigable rivers. In these areas, an applicant must obtain both a MDEQ and USACE permit before conducting a regulated activity.

Section 30312(2) states “the department may impose conditions on a permit for a use or development if the conditions are designed to remove an impairment to the wetland benefits, to mitigate the impact of a discharge of fill material, or to otherwise improve water quality.”

Mitigating the impact of a discharge of fill material generally requires the creation of a replacement wetland. The replacement wetland must usually be larger than the lost wetland, of the same biological type, and designed to replace the functions being lost. When mitigation for wetland impacts involves creating replacement habitat, it is known as compensatory wetland mitigation. For purposes of this report, the term “mitigation” refers to compensatory wetland mitigation.

There are two types of permits issued under Part 303. First, General Permits (GPs) are issued for projects expected to have only minor impacts on wetlands. These projects are not public noticed and wetland mitigation is not required

(See R 281.925 Rule 5[9]). Second, individual permits are issued for projects whose wetland impacts are larger and more complex than GPs. These projects must be public noticed and may also involve a public hearing. Wetland mitigation is generally required for impacts authorized by individual permits. All mitigation projects evaluated during this study required individual permits.

C. Scope of Study

This study examined 78 individual permits and their associated 159 mitigation sites. Projects from all areas of the state were evaluated. Fifty-four (70%) of the projects evaluated were located in the southern half of the lower peninsula while twelve (15%) projects were located in both the northern half of the lower peninsula and the upper peninsula. The geographic location of the projects is shown in Figure 1. Except for the western half of the Upper Peninsula where former districts 1, 2, and 3 were combined, a minimum of four projects were evaluated for each MDEQ district. (See Figure 2.)



Figure 1: Mitigation Project Location Map

Note: The District alignment shown was in effect during the study period (1980 - 1997). District boundaries shown are no longer in effect

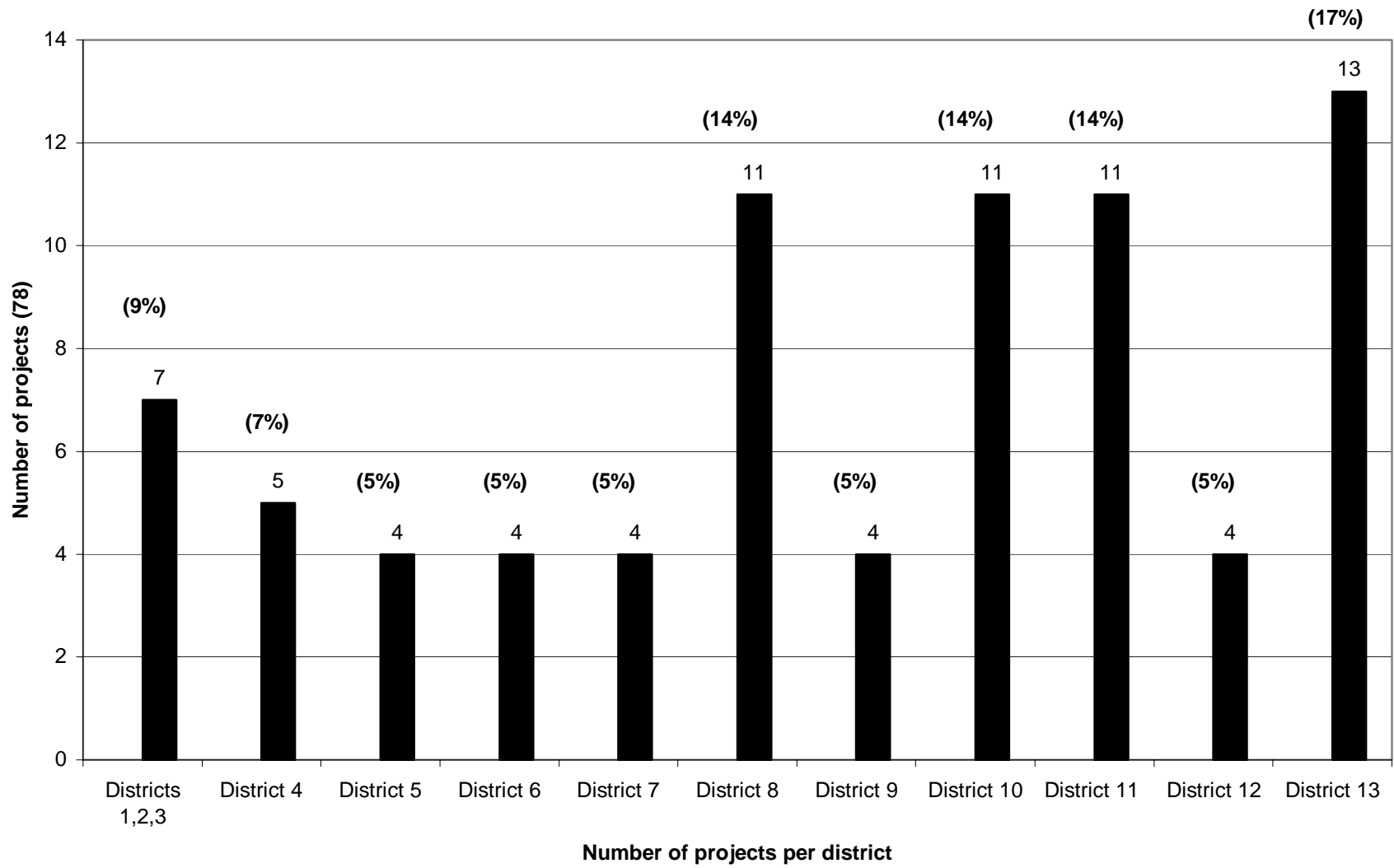


Figure 2: Number of projects reviewed from each district

In the fall of 1997, 24 MDEQ files were reviewed, the permits evaluated, and their associated mitigation sites inspected. In the summer of 1999, an additional 54 permits and their associated mitigation sites were reviewed and inspected. The 78 permits evaluated were applied for between 1987 and 1998. An attempt was made to evaluate a cross-section of mitigation projects spanning the earliest years of Michigan's program to the present.

It is generally accepted that evaluation of constructed wetlands should not occur until after the passage of two or three complete growing seasons. This allows sufficient time for the establishment of wetland hydrology and hydrophytic vegetation. For this reason, very few projects applied for after 1996 were evaluated. Of the 78 projects evaluated, 15 (19%) were applied for between 1987 and 1991, 57 (73%) were applied for between 1992 and 1996, and 6 (8%) were applied for in 1997 and 1998 (See Figure 3).

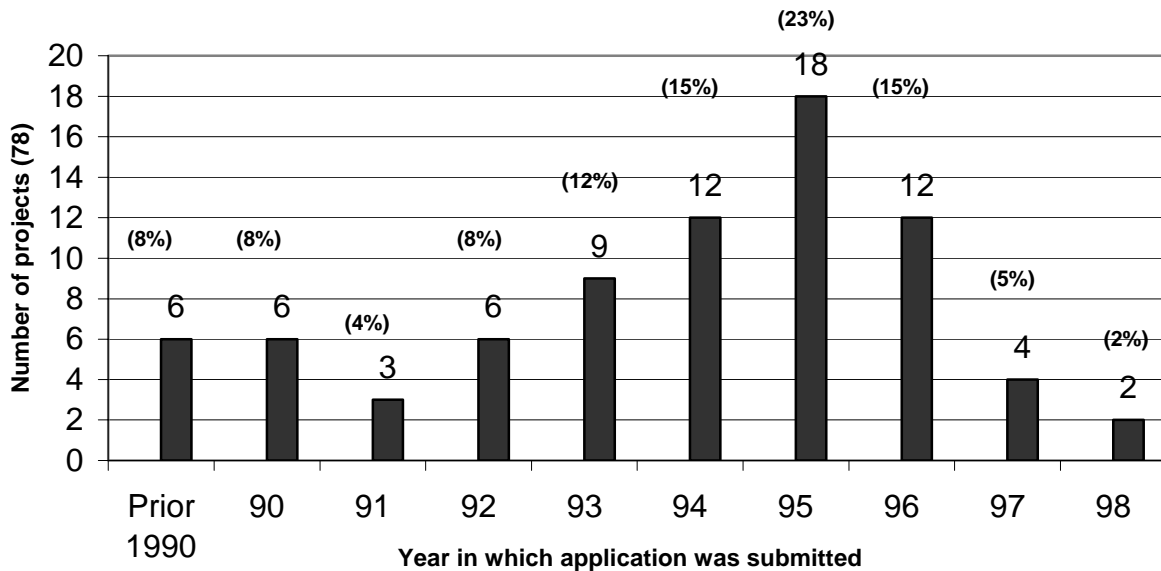


Figure 3: Number of selected projects from each year investigated

D. New Mitigation Rules

During the study period MDEQ staff have been working to promulgate new administrative rules regarding wetland mitigation. Phase I of these rules became effective on April 27, 2000. The new mitigation rules address some of the problem areas identified during this study. The new mitigation rules will lead to more consistent administration of Part 303 mitigation requirements. Highlights of the new mitigation rules include the following:

- 1) Wetland mitigation is required for impacts of one-third acre or larger (unless the project qualifies for a general permit).
- 2) Acceptable methods of mitigation include:
 - a) Restoration of previously existing wetlands.
 - b) Creation of new wetlands.
 - c) Acquisition of approved credits from a wetland mitigation bank.
 - d) Preservation of existing wetlands (in limited circumstances).
- 3) Restoration of previously existing wetlands is the preferred method.
- 4) Enhancement of existing wetlands is not considered mitigation.
- 5) The specific elements that must be included in an acceptable mitigation plan are identified/defined.
- 6) Provides guidance on siting mitigation when on-site mitigation is not practical and beneficial.
- 7) Mitigation must be of a similar ecological type as the impacted wetland, where feasible and practical.
- 8) Mitigation ratios are established where the replacement wetland is of a similar ecological type. Ratios may be increased when the replacement wetland is of a different type.
- 9) The permittee is required to complete the mitigation before initiating the permitted activities unless a concurrent schedule is agreed upon between the MDEQ and the permittee and an adequate financial assurance mechanism is provided by the applicant.
- 10) The permittee is required to protect the mitigation area by a permanent conservation easement or similar instrument that provides for the permanent protection of the natural resource functions and values of the mitigation site.

The new rules mandate that permitting staff require wetland mitigation for more projects than in the past. The new mitigation rules are attached as Appendix A.

Due to the administrative rules on mitigation in effect at the time of this study, the MDEQ normally required wetland mitigation on the site where the loss occurred. These old rules facilitated the practice of siting mitigation wetlands wherever there were available uplands on the project site (i.e. areas not being proposed for development). The previous rules also limited the opportunities to incorporate wetland restoration concepts to address mitigation requirements.

II. METHODS

A. Compilation of Mitigation Data

At the time this study was initiated, there was no centralized system in place to record mitigation data or track permits that required mitigation. Each of the LWMD's District offices either kept their own records, or kept no records at all. Where records were kept, they were often sketchy or incomplete.

The first major obstacle to overcome before the study could begin was to construct or reconstruct the mitigation requirement data for each of the 13 District offices. In early 1997, a request was made to each LWMD district supervisor to compile a list of all permits issued that required mitigation between October 1980 through December 31, 1996. Staff was asked to review any and all information sources at their disposal. Suggested sources included personal memory or employee journals, district mitigation log (if one existed), the CIWPIS¹ (Coastal and Inland Waters Permit Information System), miscellaneous mitigation monitoring reports, and their annual 404 reports².

The district supervisors were asked to prepare a list of all permits found to have required mitigation. For each permit the following information was requested:

1. file number
2. permittee's name
3. county
4. acreage of wetland lost
5. acreage of mitigation required
6. location of the file and monitoring reports (if they existed)

District staff was able to provide data on 571 permits that had required wetland mitigation (See Appendix B). However, due to a lack of centralized record keeping and considerable staff turnover over this 16-year period, the information provided by the districts was not complete or entirely accurate. Even the information provided on known mitigation projects was incomplete on many projects due to the fact that files are maintained by the district offices for only three years. After that time, they are sent to a storage facility in Lansing (i.e., records center). The 571 permits identified by staff likely underestimate the total number of permits issued that required mitigation. Compiling more accurate data would be extremely difficult and time consuming. This master list of mitigation permits was updated through 1998 and is provided as Appendix C.

B. Geographic Criteria for Project Selection

Any comprehensive review of the MDEQ's wetland mitigation program must include projects from all areas of the State. Evaluation of the raw mitigation data revealed that approximately 75% of all mitigation projects were located in the southern half of

¹ CIWPIS is the LWMD's computer permit application database.

² 404 report is an annual report submitted to USEPA documenting all "fills" greater than 1 acre in size.

the Lower Peninsula, while 11% were from the northern half of the Lower Peninsula, and 14% from the Upper Peninsula (See Figure 4). The study design sampled the total wetland mitigation sites in approximate proportion to their distribution statewide.

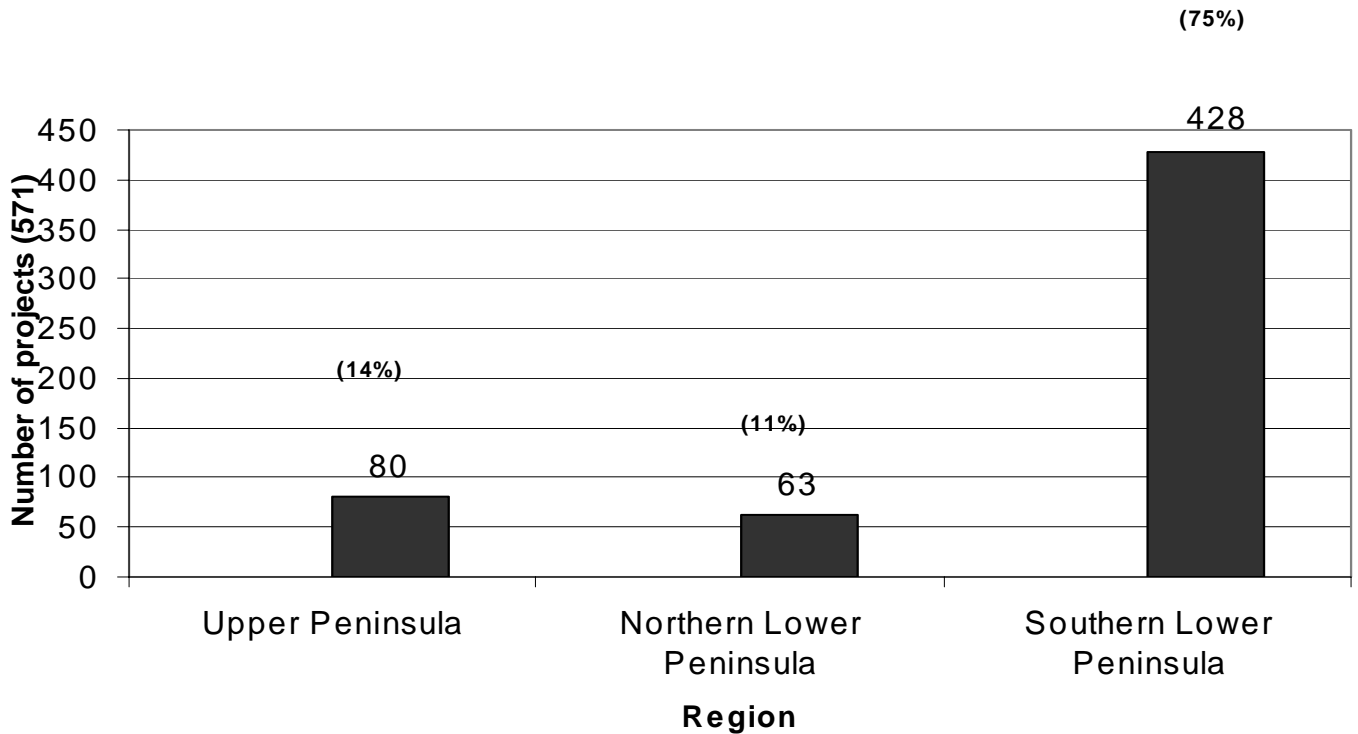


Figure 4: Number of known mitigation projects by region of state

C. Size Criteria for Project Selection

The size of mitigation projects in Michigan varies greatly. Michigan’s wetland statute does not set a minimum amount of wetland loss that requires mitigation. MDEQ’s field staff makes judgment calls as to whether mitigation is required on a case by case basis. However, wetland impacts of 0.25 acres or larger would generally have required mitigation prior to the recent rules changes. There are also numerous large projects that required extensive wetland mitigation. The largest single mitigation project undertaken to date was for expansion of Detroit’s Metropolitan Airport. Approximately 343 acres of wetland has been created and may be expanded to 467 acres in the future.

In order to utilize resources as efficiently as possible, it was necessary to set minimum and maximum size limits on the projects to be evaluated. After reviewing the mitigation requirement data, it was decided to set a minimum size requirement of one acre and a maximum size of 40 acres. While these guidelines were not strictly adhered to, every effort was made to review only those projects meeting these criteria. These guidelines were deviated from only when it was not possible to obtain the minimum number of four projects per district meeting the size criteria.

D. Age Criteria for Project Selection

There needed to be some minimum age requirement for projects selected for evaluation. In other words, the mitigation wetlands evaluated should have been constructed long enough ago that they had a reasonable period to develop. Based upon previous field experience, development of the plant community in mitigation wetlands generally requires a minimum of two complete growing seasons to develop to the point where evaluation is meaningful. While this minimum age criterion was not strictly adhered to, every effort was made to evaluate only those projects meeting it. This criterion was deviated from only when it was not possible to obtain the minimum number of four projects per district meeting the age criteria.

E. Methods Used for Project Selection

Each district supervisor, in consultation with their staff, was requested to submit a list of between 10 and 15 projects that met the size and age criteria. They were requested to provide equal numbers of known successful projects, unsuccessful projects, and projects where no information was available. If any office was unable to provide a complete list, the author randomly selected mitigation projects meeting the size and age criteria for that district. While not random, this selection process established a representative group of projects from which wetland design and construction practices could be analyzed.

F. Final Project Selection

After review of the information provided by the district offices, any projects not meeting the size or age criteria were eliminated from consideration and replaced by randomly selected projects. Lists not containing at least ten mitigation projects were supplemented with randomly selected projects.

After the lists were completed, each original MDEQ file was recalled from the appropriate district office or from the records center in Lansing for an initial review. Many of these projects were eliminated from further consideration for the following reasons: 1) the original file could not be located, 2) the permit had been extended past its original expiration date, making it unlikely that the mitigation would have been undertaken, and 3) the project did not require mitigation and was listed in error. Additional projects were randomly selected and added as necessary. In a few instances, projects falling outside the size or age criteria were used in order to adequately represent a district when the candidate list was exhausted.

G. File Review

Once a project was accepted for the study, a complete detailed review of the file was conducted to compile specific information. All pertinent documents were copied and a "mitigation file" was created. The amount of information available in each file varied.

H. Evaluation Procedures

Prior to inspecting the individual mitigation projects, standard procedures were developed for conducting the inspections and selecting specific criteria to be evaluated. A standard evaluation form to be completed during the on-site inspection was determined to be the most appropriate method for achieving accurate and reliable data collection. The Mitigation Project Review Report (MPRR) form was designed in such a manner that it would require the evaluator to examine information from the permit file in addition to recording observations and compiling biological information while on the mitigation site. At the conclusion of the evaluation, this form would aid the evaluator to objectively answer two basic questions: 1) did the mitigation project comply with all permit conditions, and 2) was the mitigation project successful?

Most permits requiring wetland mitigation contain specialized conditions specific to the created wetland. In many cases the permit also referenced mitigation plans that specified what was to be constructed. Questions regarding compliance were tailored to these standard mitigation permit conditions.

Determining whether a mitigation project was “successful” was more difficult. Exactly what constitutes a “success”? Ideally, each permit document, or the approved mitigation plan, should include specifications or performance criteria for making this determination. Unfortunately, most of the permits evaluated in this study do not contain such language. In most cases, an approximate acreage figure of a generalized wetland type to be created was usually the only mitigation requirement (e.g., “create two acres of emergent wetland”). The evaluation form, therefore, needed to be developed to evaluate whether a wetland had been created (i.e., does the area contain a predominance of hydrophytic vegetation, wetland hydrology, and acceptable soils). If documentation could be obtained that the mitigation area met the wetland parameters for vegetation and hydrology, it could “preliminarily” be considered successful (i.e., a wetland had been created). However, permit specific criteria such as wetland type and required size would be considered prior to making the final determination. In other words, if the wetland type and size requirements were not fully met, the wetland mitigation was not considered successful.

The MPRR contains three basic sections, Legal Requirements, Physical and Biological Factors, and Preliminary Ratings (See Appendix D).

1) Legal Requirements

This section requires the reviewer to address whether construction of the mitigation area was completed in accordance with the permit requirements. However, prior to evaluation of the mitigation area, the reviewer must first determine whether the permitted activity was conducted. Once it had been determined that the permitted activities were in fact completed, on-site evaluation of the mitigation wetland would follow.

The legal requirements section contains three types of questions:

- A. Questions requiring the reviewer to compare the physical characteristics of the mitigation area to the permit requirements, i.e., the number of mitigation sites required, the size and shape of the mitigation area, water depths, presence of topsoil, presence of wildlife habitat structures, and evidence of erosion problems.
- B. Questions regarding the permit file to determine whether required documents such as “as built plans,” annual monitoring reports, and conservation easements and financial assurances were submitted.
- C. Questions regarding whether any activities within the mitigation area were in violation of Part 303 or the permit.

2) Physical and Biological Factors

The physical and biological factors section of the MPRR required the reviewer to examine the mitigation area’s hydrology, soils, vegetation, and wildlife usage. The hydrology questions required the reviewer to evaluate whether the mitigation area contains water at a frequency and duration sufficient to support wetland vegetation or aquatic life. Visual estimates were made for the percentage of the mitigation area containing standing water, saturated soil, or evidence of seasonal flooding or saturation.

The soils questions addressed the type of soils to be placed (i.e., organic, hydric topsoil, upland topsoil) within the mitigation area, its required depth, and whether the soils present were providing a high quality growing medium. Examination of the top layer of soil with a probe or shovel was required. Visual estimates of the soil quality were made by noting the density of the vegetative cover and whether there are significant areas that were devoid of vegetation.

The vegetation questions relate to the major cover types within the mitigation area and the listing of the dominant species found within each type. Visual estimates for percent cover and the indicator status for each plant species were recorded. Other issues investigated included whether noxious species were a problem, the percentage of the mitigation area containing a predominance of hydrophytic vegetation, and the percentage of each wetland type found within the mitigation area.

The wildlife questions addressed the types of wildlife habitat structures observed within the mitigation area and any evidence of wildlife use. Visual observations were the primary data collection method used. Both direct (actual observation of an animal) and indirect (observation of tracks, burrows, scat, etc.) evidence were documented. Auditory evidence such as bird songs and amphibian calls were also noted. The presence of wetland dependent animals such as amphibians, turtles, and waterfowl was especially significant.

3) Preliminary Ratings

Completion of the preliminary ratings section of the MPRR provided a summary of the “Legal Requirements” and “Biological Factors” sections. Each project received an “in compliance” or “noncompliance” rating for the Legal section and a “successful” or “failure” rating for the Biological section. The reviewer then provided an “overall rating” of “successful” or “failure” and rated the project “quality” on a scale of zero to ten. These preliminary (or field ratings) were the final ratings unless new information warranted a change.

The legal rating was straightforward. If the mitigation project complied with all permit conditions, it received a “in compliance” rating. If permit conditions were not complied with, it received a “noncompliance” rating.

The biological rating was not as straightforward because specific criteria defining “success” did not exist in the vast majority of permits. To determine if a biologically successful mitigation project existed, the basic characteristics that constitute a wetland had to be present. In the simplest sense, if the mitigation area met the definition of a wetland as defined in Part 303, and was the required size, it was determined to be “successful.” While some permits required that a specific wetland type be created, this study concentrated more on whether a wetland was created, as opposed to whether the required type of wetland was created. If the mitigation area did not contain the amount of wetland required in the permit, it received a “failure” rating.

The criteria in Part 303, R 281.924, “Wetland Determinations,” was used to determine if a mitigation area meets the definition of a wetland. The predominance of wetland vegetation and visible evidence that the normal seasonal frequency and duration of water is above, at, or near the surface was the criteria used. Where there was a predominance of wetland vegetation, and no direct visible evidence that water is, or has been, at or above the surface, the soil profile was examined for evidence of hydrology. The presence or absence of wetland dependent wildlife was also considered in cases where the soil characteristics were inconclusive.

The “overall rating” for each project was determined by examining the ratings for both the legal and biological categories. If the ratings in these categories were both negative (i.e., noncompliance and failure), the “overall rating” was “failure.” If the ratings for both categories were positive (i.e., in compliance and successful), the overall rating was “successful.” If the rating for the legal category was noncompliance but the biological rating was “successful,” the overall rating was determined by using best professional judgment. (There were 17 projects found to be non-compliant with the legal rating but biologically successful. Five were rated as failures because, as-built plans were not provided, five-year monitoring was not conducted, a mitigation plan was not provided and conservation easements were not conveyed.) If the rating for the legal category was “in compliance,” but the biological rating was “failure,” the overall rating was “failure.” (See Table 1).

TABLE 1: Matrix Ratings

<u>Legal Rating</u>	<u>Biological Rating</u>	<u>Overall Rating</u>	<u>Quality Rating</u>
In compliance	Successful	Successful	0 to 10
Non-compliance	Failure	Failure	0 to 10
Non-compliance	Successful	Either Successful Or Failure	0 to 10
In compliance	Failure	Failure	0 to 10

The "quality" of the constructed wetlands was rated using the best professional judgment of the reviewer. Projects were rated between zero and ten; zero being not constructed and ten being extremely high quality. While this method was arbitrary, it was used in a very general sense to categorize projects.

I. Mitigation Site Review Summary Form

The Mitigation Site Review Summary Form (See Appendix E) was developed for use during the data compilation stage of the study. The Mitigation Site Review Summary Form was comprised of six sections. In the first section, general information from the project file regarding project type, acreage of wetland impacts, mitigation ratio, and whether the mitigation was to be constructed "on-" or "off-" site is gathered. The second section involved a determination of which mitigation specific permit conditions were used and whether they were complied with. The third section dealt with the physical characteristics of the created wetland. The fourth section listed the ratings given to the mitigation project from the MPRR. The fifth section indicated whether MDEQ staff ever followed-up on the mitigation project, and if so, the reason for the follow-up. The final section of the form allowed for a brief comment and was optional. The findings of the study were based upon the categories of information contained in the Mitigation Site Review Summary Form.

J. Site Inspection

After completion of the in-office review, an on-site inspection was conducted to evaluate the mitigation site(s). For the purposes of this study, a "site" consists of an individual wetland mitigation basin or area. Many projects had multiple mitigation sites. Site inspections were conducted from August through October of 1997 and between June and September of 1999. In 1997, 24 projects were evaluated and 54 in 1999. Site inspections were conducted during a period of below average precipitation in Michigan, which could have affected the results. The author inspected all 78 mitigation projects and the associated 159 mitigation sites. The LWMD field staff from district offices participated in approximately one-third of these inspections. For purposes of consistency, the author performed all data collection and ratings.

Site inspections consisted of three steps. Step 1) Upon arrival at the mitigation site, a complete review of the "mitigation file" was conducted. Special attention was given to permit conditions referencing mitigation requirements. All mitigation conditions were then highlighted for future reference and all mitigation reports and plans were reviewed. The most recent mitigation monitoring report was read (if one had been submitted). The "general information" questions (Items 1-17) and the legal requirements section (Items 18-29) of the MPRR were completed to the extent possible. Step 2) The actual mitigation wetland(s) were then inspected. Generally, a cursory walk around the perimeter of the wetland was conducted to become familiar with the site. Photographs and notes were taken to document general observations. Specific sections of the wetland were identified for more detailed evaluation. Access was possible to all but the deepest water areas of the mitigation areas. Information was collected on the vegetative communities, soils, and hydrological conditions. The "Physical and Biological Factors" section of the MPRR (Items 30-61) were completed during this step (Step 3). After completing the inspection, but prior to leaving the site, the "Preliminary Ratings" section of the MPRR (Items 62-65) and any other items not addressed earlier were completed. The Mitigation Site Review Summary Form was then completed prior to leaving the site. As the field investigations were completed, the photographs for each project were developed, documented, and placed within the mitigation file.

K. Final File Review and Data Tabulation

A final review of the file was performed to identify any additional information that was needed to complete the evaluation. Any new information that had become available since completion of the site inspection was reviewed at this time. Once all of the information had been reviewed, the preliminary ratings were adjusted as necessary and became the final rating. If no additional information was available, the preliminary field ratings became the final rating.

When all final file reviews had been completed the data from the 78 Mitigation Site Review Summary Forms were entered into an Excel spread sheet and tabulated. (See Appendix F.)

III. RESULTS

A. General Information

This study provided the opportunity to compile general information on past mitigation projects that can be used in identifying problem areas and to make program improvements. Information was compiled for the following categories: project type, project location (i.e., county), acreage of wetland impacts, mitigation ratios used, mitigation acreage required, whether the mitigation was constructed “on-site” or “off-site,” and the age of the mitigation site at the time of evaluation. Specific information and final ratings for each of the 78 selected projects along with representative photographs of the mitigation project can be found in Appendix G. Final results for all 78 projects are summarized in Table 2.

Table 2:

Mitigation Site Review Summary

Number	78 Projects	
Acreage of Impact	267.87 acres (total)	
Ratio	1.82 average, see figure 7	
Mitigation Acreage Required	488.4 acres	
On or Off-site	58 on site, 17 off site, 2 both	
Age of Mitigation Site	3.16 years Ave. See figure 10	
Special Conditions	Required?	Compliance?
Mitigation acreage	57 (75%)	35 (63%)
Mitigation plan	61 (80%)	43 (70%)
Conservation easement	31 (41%)	11 (39%)
As-built plans	38 (50%)	4 (11%)
Monitoring	66 (87%)	21 (35%)
Elevated Structures	13 (17%)	8 (61%)
Due date for construction	34 (45%)	19 (57%)
Prohibited Acts	36 (47%)	25 (80%)
Corrective Action	59 (78%)	7 (20%)
Financial Assurances	9 (12%)	3 (43%)
Number of sites required	159	
Number of sites constructed	136 (86%)	
Number of sites with required wetland acreage	65 (50%)	
Number of sites with excessive open water	58 (42%)	
Number of sites with insufficient hydrology	43 (32%)	
Number of sites with wetland soils	80 (59%)	
Number of sites with active erosion	28 (20%)	
Number of sites with poor water clarity	36 (26%)	
Number of sites with invasive species problem	11 (8%)	
Estimated loss of wetlands	45% of projects did not replace at a min. of 1:1	55 acres
Legal Rating	13 in compliance (18%)	61 non-compliance (82%)
Biological Rating	20 successful (29%)	49 failure (71%)
Overall rating	15 successful (22%)	54 failure (78%)
Quality rating	Average rating 3.75	
Follow-up site inspection performed by field staff	20 projects inspected (26%) 57 not inspected (74%)	
Reason for follow-up site inspection	13 routine follow-ups (17%) 6 followed up due to a reported complaint (8%) 1 unknown reason (1%)	

1. Counties

Projects were evaluated in 33 of Michigan's 83 counties (See Figure 1). Most mitigation projects were located within counties that contain large metropolitan areas and have experienced rapid growth over the last 15 years. Twenty-six of the projects reviewed were located within a five-county area in southeast Michigan (Detroit Metropolitan Area). Table 3 shows the number of projects evaluated in each county.

County	Number of Projects	County	Number of Projects
Washtenaw	12	Mason	2
Wayne	6	Sanilac	2
Bay	4	Calhoun	1
Genesee	4	Charlevoix	1
Ottawa	4	Cheboygan	1
Arenac	3	Grand Traverse	1
Houghton	3	Gratiot	1
Ingham	3	Iosco	1
Livingston	3	Isabella	1
Mackinac	3	Jackson	1
Oakland	3	Manistee	1
Allegan	2	Menominee	1
Chippewa	2	Ontonagon	1
Emmet	2	Saginaw	1
Huron	2	Tuscola	1
Macomb	2	Van Buren	1
Marquette	2		

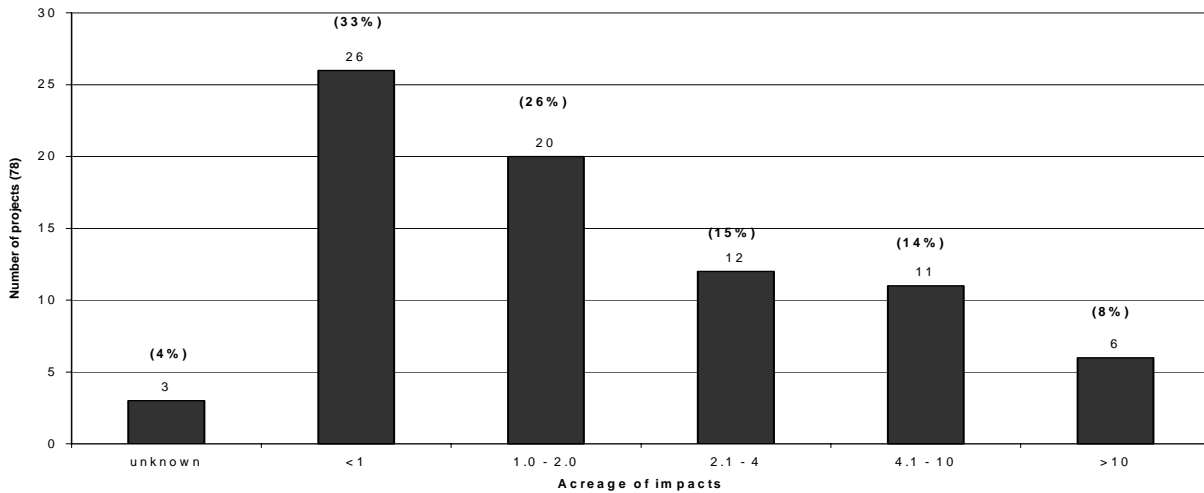


Figure 5: Acreage of Wetland Impacts

2. Acreage of Impact

Total acreage of wetlands impacted for the 78 permitted projects evaluated was 267.87 acres. The average wetland impact per project was 3.57 acres. (See Figure 5.)

Mitigation ratios varied from 1:1 (one acre of wetland created to one acre of wetland impact) to 2:1 for the vast majority of the projects reviewed. Even though mitigation ratios were not tracked by year, it appeared that a 1:1 mitigation ratio was common during the early years of the program (1985-1990), while a mitigation ratio of 1.5:1 became more common during the 1990s. Ten of the 76 permits (13%) used a 1 to 1 ratio while 26 of the permits (34%) used a 1.5 to 1 ratio. Thirty-three of the permits (43%) used a mitigation ratio greater than 1.5 to 1. The mitigation ratio used on five of the permits (7%) was not specified on the permit and could not be determined due to the lack of information regarding the amount of wetlands impacted and/or the size of the mitigation area required (See Figure 6). The average mitigation ratio used for all 76 permits was 1.82 to 1.

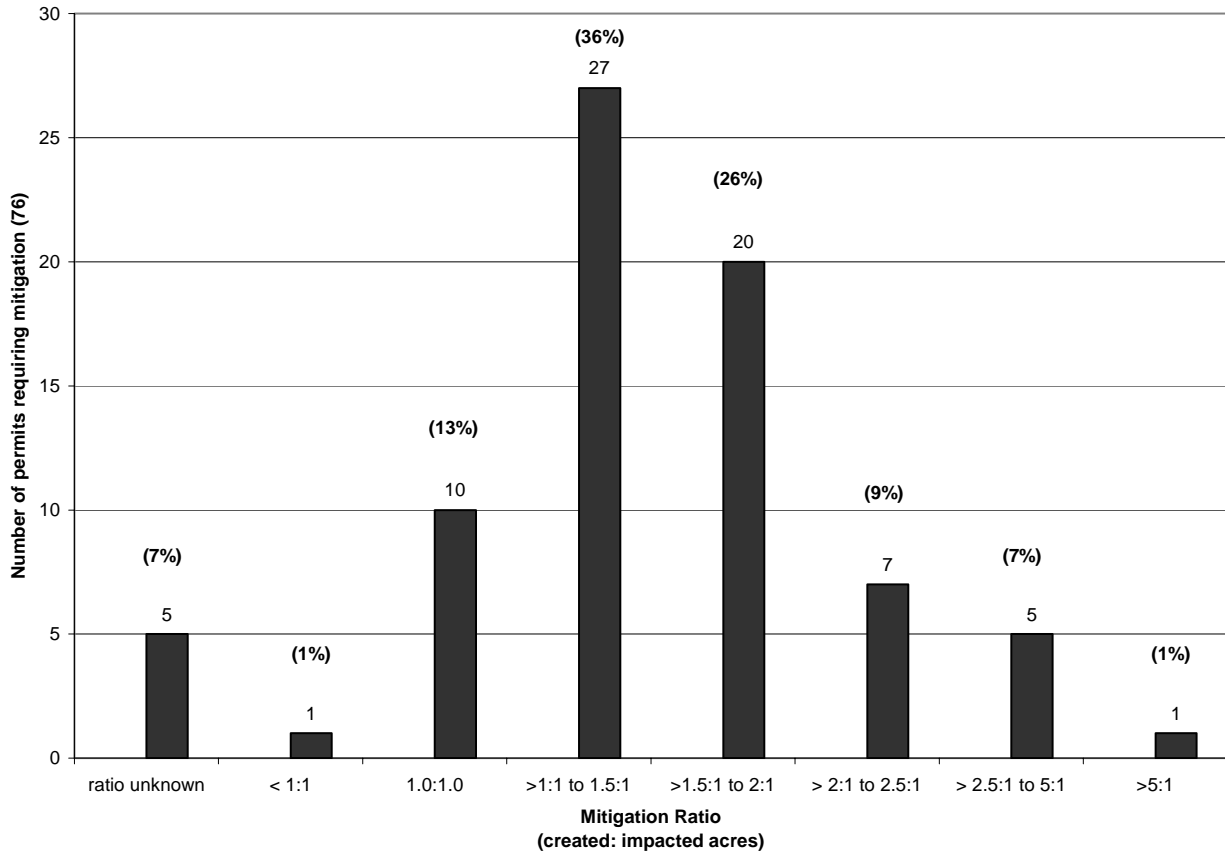


Figure 6: Mitigation Ratios (acreage of mitigation : acreage of impact)

3. Mitigation Acreage Required

The total mitigation acreage required for all 76 permits issued was 488.4 acres. One permit evaluated did not require mitigation, and a second project resulted in a violation and was never permitted. The average size mitigation project evaluated was 6.34 acres. Forty-three of the mitigation projects (57%) were between 1 and 5 acres in size. Eleven projects (14%) were less than 1 acre in size, and 20 projects (26%) were greater than 5 acres in size (See Figure 7).

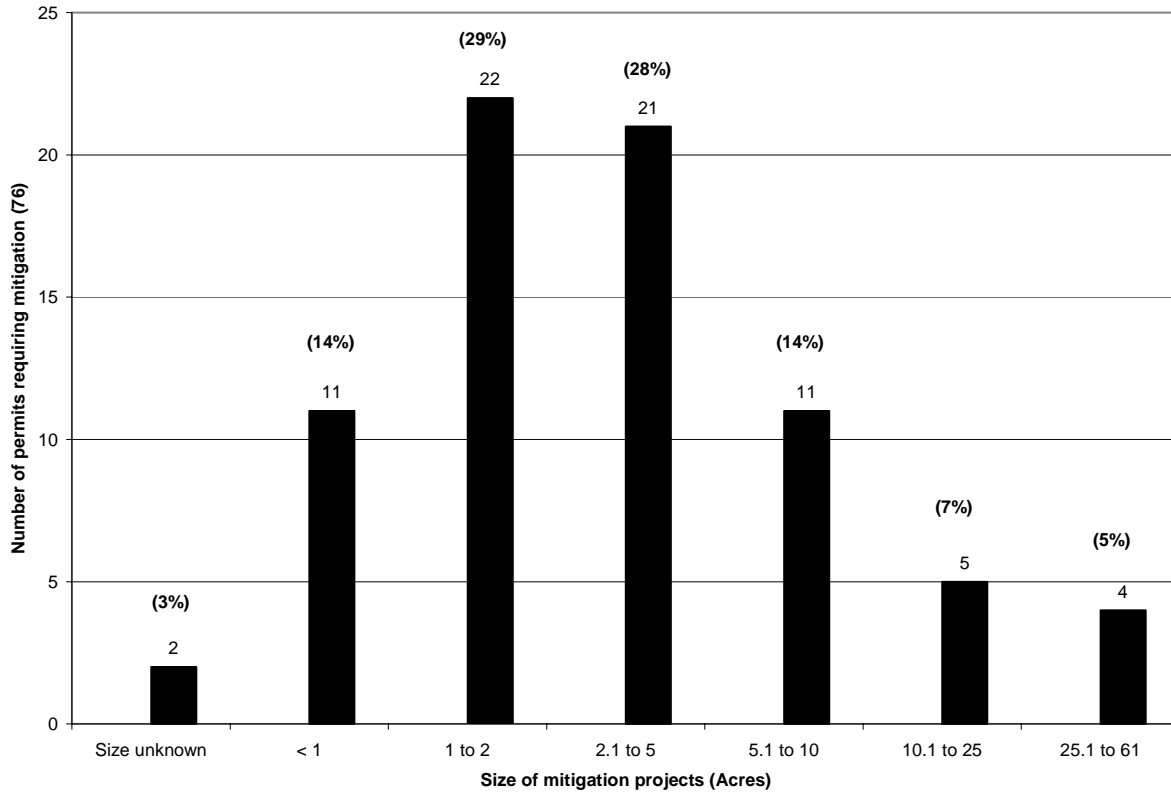


Figure 7: Size of Mitigation Projects

4. On-Site vs. Off-Site Mitigation

Of the 76 permits that required mitigation, 58 (76%) required on-site mitigation, 17 permits (22%) allowed off-site mitigation, while 2 permits (3%) allowed both on and off-site mitigation (See Figure 8).

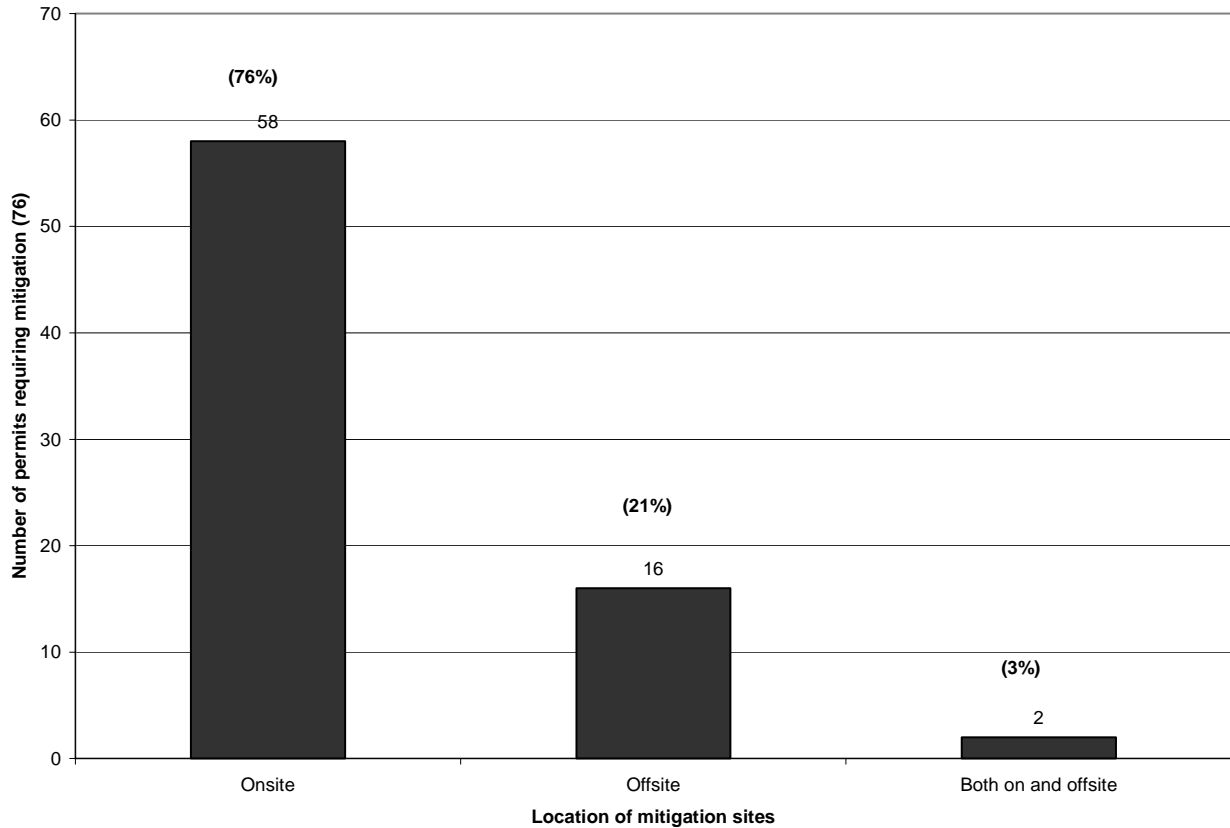


Figure 8: Sitings of Mitigation

5. Age of Mitigation Projects

Sixty-four of the 78 mitigation projects evaluated had been constructed. The age of the constructed wetlands varied between one and ten years and averaged three years. Fifty-four of the mitigation projects (84%) were at least 2 years old at the time of evaluation. (See Figure 9.)

Normally, as mentioned earlier in this report, a minimum of two years is required for a mitigation area to develop wetland characteristics. Therefore, those projects less than two years old may have not had adequate time to fully develop wetland characteristics.

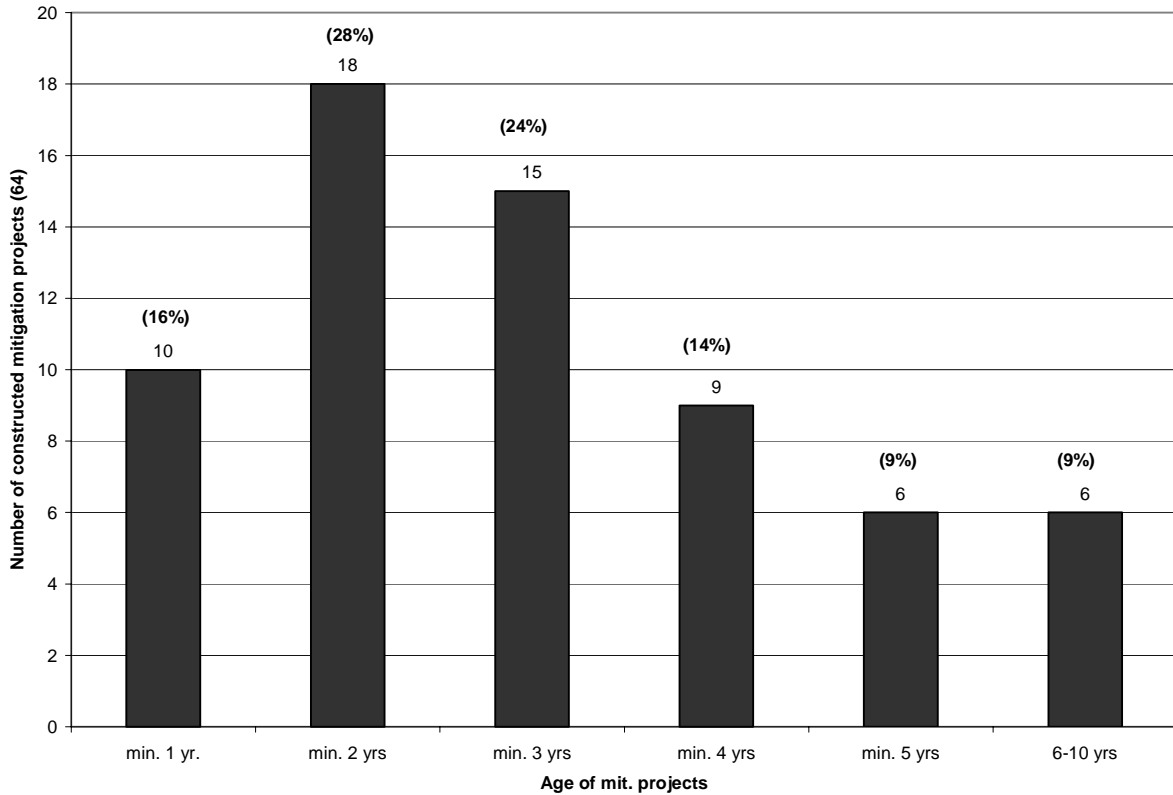


Figure 9: Age of Mitigation Projects

B. Permit Composition and Compliance

During the study, considerable attention was given to the composition of permit documents. Particular attention was paid to whether the permits contained mitigation specific conditions. Each permit was reviewed for the presence of ten standard mitigation specific conditions. These ten conditions deal with 1) required size of the mitigation wetland, 2) whether a mitigation plan was referenced, 3) whether a conservation easement was required, (4) whether as built plans were required, 5) whether monitoring was required, 6) whether elevated wildlife structures were required, 7) whether a mitigation completion date was specified, 8) whether prohibited acts were listed, 9) whether corrective action language was included, and 10) whether financial assurances were required.

Most of the ten mitigation issues referenced above are self-explanatory. However, the condition regarding referencing a specific mitigation plan needs clarification. A mitigation plan generally includes construction drawings, details on the types of wetlands to be created, soil placement, expected water levels, whether vegetative plantings will be completed, and monitoring are generally components of the mitigation plan. In many of the cases examined, the permit was issued before specific details of the mitigation plan were known. Most offices have a special condition that identifies the information that must be submitted and a timeframe within which it must be submitted. A reference to an approved mitigation plan in the

permit or a reference to the information that must be submitted were both considered to have addressed this issue.

The details of the permits evaluated and their sophistication varied greatly throughout the state. Many of the mitigation conditions have been standardized for many years. However, numerous mitigation conditions have been developed by staff "as needed" for individual situations. Some of these conditions were used quite regularly in the office where they were developed, but are seldom disseminated to other districts. Over time, this process results in permits of varying quality. Generally, those districts that issued the most permits requiring mitigation tended to have the most complex and detailed mitigation conditions. While mitigation permit conditions were not completely standardized throughout the state, most district offices had similar conditions to address these ten basic mitigation issues.

The following results are based on 76 permits issued that required mitigation. Of the 78 files reviewed, a permit was not issued for one file and mitigation was not required for another.

- 1) Fifty-seven of 76 permits (75%) contained a condition specifying the amount of mitigation required. Sixty-three percent of permittees complied with this condition when it was used.
- 2) Sixty-one of 76 permits (80%) contained a condition that referenced a mitigation plan. Seventy percent of permittees complied with this condition when it was used.
- 3) Thirty-one of 76 permits (41%) contained a condition requiring a conservation easement be provided over the mitigation area. Thirty-nine percent of permittees complied with this condition when it was used.
- 4) Thirty-eight of 76 permits (50%) contained a condition requiring as-built plans be submitted after construction of the mitigation area. Eleven percent of permittees complied with this condition when it was used.
- 5) Sixty-six of 76 permits (87%) contained a condition requiring annual monitoring of the created wetlands (usually for 3 or 5 years). Thirty-five percent of permittees complied with this condition when it was used.
- 6) Thirteen of 76 permits (17%) contained a condition requiring that elevated wildlife structures be placed within the mitigation area. Sixty-one percent of permittees complied with this condition when it was used.
- 7) Thirty-four of 76 permits (45%) contained a condition that specified a date by which the mitigation must be completed. Fifty-seven percent of permittees complied with this condition when it was used.
- 8) Thirty-six of 76 permits (47%) contained a condition referencing activities that were prohibited within the mitigation area. Eighty percent of permittees complied with this condition when it was used.

- 9) Fifty-nine of 76 permits (78%) contained a condition identifying the permittee's responsibilities to perform corrective measures if the mitigation wetland failed to develop. None of the permittees complied with this condition when it was used.
- 10) Nine of 76 permits (12%) contained a condition requiring the permittee to provide financial assurances to guarantee that the mitigation would be constructed to the MDEQ's satisfaction. Forty-three percent of permittees complied with this condition when it was used.

Figure 10 summarizes the frequency with which the ten mitigation permit conditions were used. Figure 11 summarizes permittees compliance with these conditions when they are used.

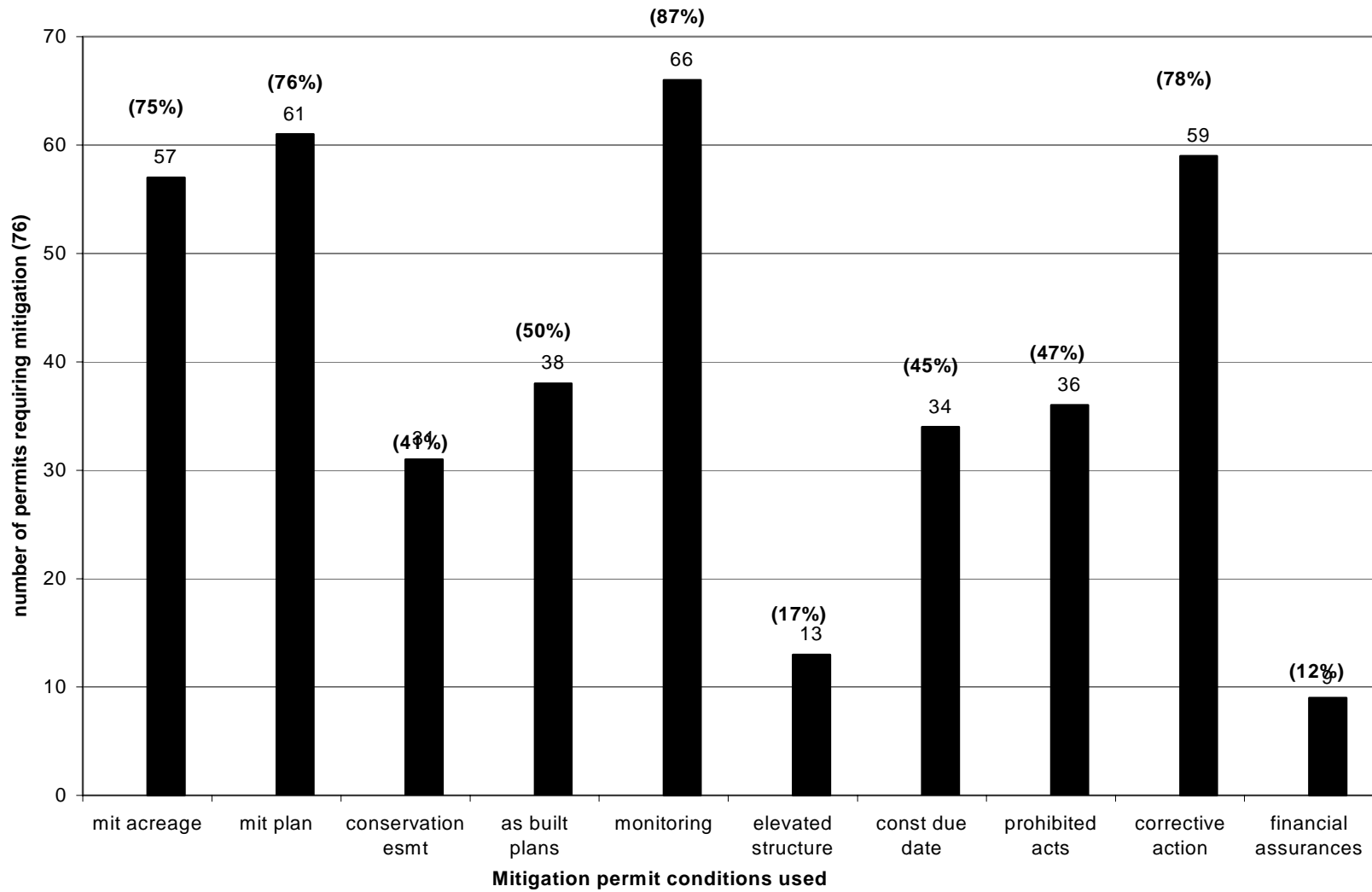


Figure 10: Use of Mitigation specific permit conditions

Physical and Biological Characteristics of the Constructed Wetlands

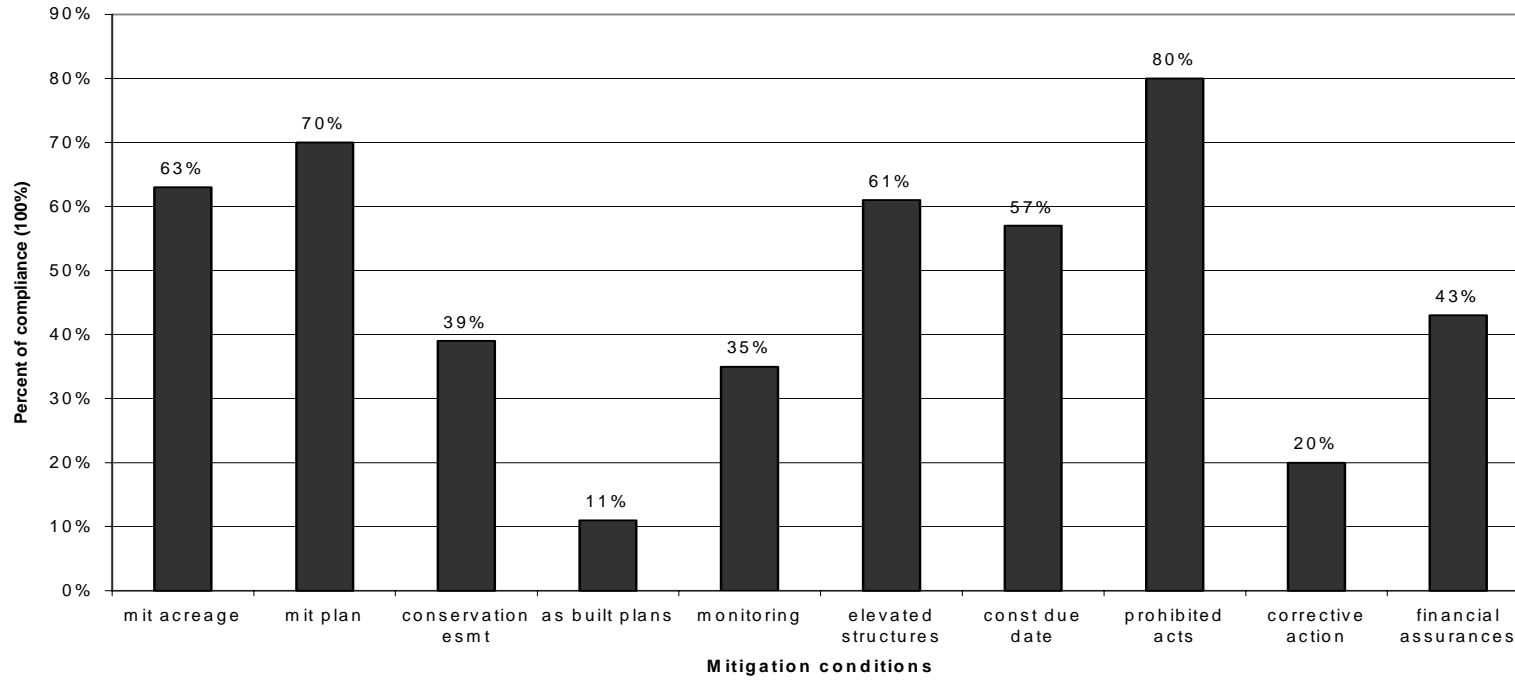


Figure 11: Compliance with Mitigation Permit Conditions

C. Physical and Biological Characteristics of the Constructed Wetlands

1) Number of Sites

The total number of individual mitigation sites required by all permits evaluated during the study was 168. However, three of the permitted projects were never initiated so the corresponding nine mitigation sites were never constructed (or required). Therefore, the total number of mitigation sites evaluated during the study was 159.

During the on-site inspections, an attempt was made to determine whether the physical size and shape of the constructed wetland matched the approved mitigation plans. Because many of the sites were large or irregularly shaped, it was extremely difficult to estimate the size of established vegetated wetlands or open water areas. Therefore, the reviewer used his "best professional judgment" to determine whether the constructed mitigation sites approximated the required size. The reviewer also made visual observations and estimations as to whether there was 1) excessive open water, 2) insufficient hydrology, 3) wetland soils placed, 4) soil erosion problems, 5) water clarity problems, and 6) invasive species concerns.

2) Number of Sites Constructed

One hundred thirty-six of the 159 mitigation sites; (86%) were partially completed or totally constructed. Twenty-three of the 159 mitigation sites, (14%) were not constructed.

3) Required Wetland Acreage

One half (65) of the 130 constructed mitigation sites, (50%) appeared to contain the appropriate wetland acreage. Six mitigation sites were eliminated from the total because insufficient time had passed since their construction to make this evaluation.

4) Excessive Open Water

Fifty-eight of the 136 constructed mitigation sites, (42%) contained excessive open water (more open water area than shown on the approved mitigation plan).

5) Insufficient Hydrology

Forty-three of the 136 constructed mitigation sites, (32%) contained insufficient hydrology (insufficient hydrology to create wetland conditions).

6) Soils

Eighty of the 136 constructed mitigation sites (59%) had adequate topsoil (hydric or upland) placed to facilitate vegetative establishment.

7) Erosion

Twenty-eight of the 136 constructed mitigation sites, (20%) had significant soil erosion problems (sediment being deposited into the constructed wetlands).

8) Water Clarity

Thirty-six of the 136 constructed mitigation sites, (26%) had significant water clarity problem (turbidity of the water that prevented or limited vegetative establishment).

9) Invasive Species

Eleven of the 136 constructed mitigation sites, (8%) had an invasive species problem (*Lythrum salicaria* [purple loosestrife], *Phragmites australis* [phragmites], or *Phalaris arundinacea* [reed canary grass] individually or combined constituted more than 10% of the vegetative community).

D. Final Ratings

For each project, an estimate was made as to whether a net loss of wetlands had occurred. This was done by comparing the size of the authorized wetland impacts to the amount of wetlands actually constructed. For any project where there was a minimum of a 1:1 replacement ratio, (enough wetlands were created to at least replace the amount of authorized wetland impacts) the loss of wetlands was considered to be 0. For all projects where there was less than a 1:1 replacement, an estimate was made as to the amount of wetlands lost due to that project.

Each project was given a rating in each of the following four categories: Legal, Biological, Overall, and Quality.

1) Estimated Loss of Wetlands

Thirty-three of the 74 required mitigation projects, (45%) did not create enough wetlands to meet a 1:1 replacement ratio. These 33 projects combined fell approximately 55 acres short of meeting a 1:1 replacement ratio.

Forty-one of the 74 required mitigation projects, (55%) met or exceeded a 1:1 ratio.

2) Legal Rating

Thirteen of the 74 required mitigation projects, (18%) earned an "in compliance" rating in the legal category for having complied with all mitigation related permit conditions.

Sixty-one of the 74 required mitigation projects, (82%) were given a "noncompliance" rating for the legal category. This rating indicated that the permittee had not complied with all mitigation related permit conditions.

3) Biological Rating

Twenty of the 69 required mitigation projects, (29%) were given a “successful” rating for the biological category. A “successful” rating was given to projects that created the required amount of wetlands regardless of the specific type to be created. Five of the projects were not given a biological rating as insufficient time had elapsed between the wetland construction and the field evaluation.

Forty-nine of the 69 required mitigation projects, (71%) were give an “unsuccessful” rating for the biological category. An “unsuccessful” rating was given to projects that did not create the required amount of wetlands regardless of the specific type to be created.

4) Overall Rating

Fifteen of the 69 required mitigation projects, (22%) were give a “successful” overall rating. The “successful” overall rating was given to projects that received both an “in compliance” legal rating and a “successful” biological rating. In addition, 12 projects receiving a “noncompliance” legal rating but a “successful” rating in the biological category were judged to be successful overall.

Fifty-four the 69 required mitigation projects, (78%) were given an “unsuccessful” overall rating.

5) Quality Rating

The scores given to projects ranged between 0 to 10. Eight projects received a score of 0 (meaning the required mitigation was not constructed). No projects scored higher than 8. The average score for all mitigation projects evaluated was 3.75. (See Figure 13.)

E. MDEQ Oversight and Follow-up

During the study, each file was examined for evidence or documentation that MDEQ regulatory staff conducted a follow-up (post permit issuance) inspection of the mitigation site. Twenty of the 77 mitigation projects, (26%) evaluated during the study received a follow-up inspection by MDEQ regulatory staff.

Reasons for follow-up inspection varied as follows:

Thirteen of the 77 mitigation projects, (17%) evaluated during the study received a routine follow-up compliance inspection by the MDEQ regulatory staff.

Six of the 77 mitigation projects, (8%) evaluated during the study received a follow-up compliance inspection due to a complaint being filed with the MDEQ regulatory staff.

One of the 77 mitigation projects, (1%) evaluated during the study received a follow-up compliance inspection for unspecified reasons.

IV. DISCUSSION

This section will discuss these results and the effectiveness of the program as it existed up until 1998. Specific recommendations follow in Chapter V of this report.

The MDEQ has taken many steps to improve wetland mitigation since this study was initiated. The most substantial program improvements include:

Wetland mitigation banking rules were promulgated in December 1997. The rules describe the requirements for establishing a bank, the contents of a banking agreement, the procedures to be used by the MDEQ to approve credits, and, generally, how and when credits can be used. Prior to the promulgation of the rules, the MDEQ had no specific authority or procedures for conducting mitigation banking in Michigan. The rule will improve wetland mitigation by providing for the establishment of replacement wetlands prior to wetland losses, by consolidating small wetland mitigation areas at a single location, and by encouraging the integration of wetland restoration or creation into watershed or ecoregion planning. MDEQ signed the first banking agreement, with Wayne County, in October 1999; construction began in summer 2000.

The MDEQ is encouraging wetland mitigation banking through development of informational materials and is working on several banking projects which are at various stages of development. As part of a grant agreement with Wayne County, staff is developing a Wetland Mitigation Handbook that will describe banking procedures and technical considerations in lay terms. The Handbook will be available later this year. Staff is also developing internal procedures and additional fact sheets to provide readily available information to potential bankers.

Administrative rules were promulgated in April 2000 to clarify and standardized wetland mitigation requirements for permitted wetland impacts. The issues addressed by the administrative rules that will specifically aid in improving wetland mitigation in Michigan include:

1. Type of mitigation – The rule allows for the restoration, creation, use of credits from a mitigation bank, and, in certain circumstances, preservation of existing wetland as wetland mitigation. The rules establish a clear preference for the restoration of previously existing wetlands over the creation of new wetlands. More successful mitigation projects should result due to the clear preference for restoration and the allowance for use of wetland mitigation bank credits.
2. Mitigation plan – The rule authorizes the MDEQ to require a mitigation plan and outlines the requirements for the plan, including performance standards, a monitoring plan, schedule for completion of the mitigation and provisions for long-term management and protection of the mitigation site. When required by, or incorporated into a permit for wetland impacts, the mitigation plan will provide a basis for tracking compliance with mitigation requirements and for measuring the success of the mitigation.
3. Mitigation location – The rule establishes criteria for determining the location of wetland mitigation based on the practicality of the location and the benefit to wetland resources. On-site wetland mitigation is called for by the rule only when it is

practical and beneficial to the wetland resources. This, together with the preference for wetland restoration as mitigation, will enable the permittee and staff to select a site where mitigation is most likely to be successful and beneficial.

Staff is developing guidance to assist with implementation of the new wetland mitigation rules. The guidance will address issues dealing with the type of mitigation, application of mitigation ratios, siting of mitigation projects, the content of and timing for submittal of a mitigation plan, and requirements and procedures for conservation easements and financial assurances, among others.

A computerized wetland mitigation tracking system was developed and is now available for all permitting staff. The database stores mitigation information for each permit file (i.e., acres of wetland impact permitted, acres and types of wetland mitigation required, the location of the mitigation site(s)) and tracking information needed to determine compliance with mitigation-related permit conditions (i.e., due dates and date of receipt for items such as the final mitigation plan, conservation easement, financial assurances, monitoring reports, certification of mitigation). Staff can query the database on a routine basis to ensure compliance with mitigation requirements. The system is a stand-alone database that is linked to the MDEQ's permit database, CIWPIS. Efforts are ongoing to also make mitigation information available in place-based and GIS formats.

Studies of the success of wetland mitigation have found results similar to this study. Generally, the rate of compliance with mitigation requirements in permits and the success of mitigation wetlands are low. Recent mitigation studies conducted by the United States Fish and Wildlife Service (Gallihugh, 1998) and the Indiana Department of Environmental Management (Robb, 2000) were examined for comparison.

Results from this study found that 85% of the examined mitigation sites were constructed. The Indiana study determined that 82% of mitigation sites were constructed or partially constructed. The Indiana study also cited a South Florida study where only 20% of the mitigation sites were constructed.

In this study 18% of permittees complied with all mitigation related permit conditions. The USFWS study found that only 4% of permittees complied with all mitigation related permit conditions. The USFWS study also referenced an earlier USFWS Chicago area study where 34% of permits were found to be in compliance with permit conditions and mitigation plans and a New Jersey study where 43% of mitigation sites were done in a manner consistent with mitigation plans and special conditions.

In this study 22% of mitigation projects were considered successful. The USFWS found that 39% of mitigation projects were successful. The USFWS also cited a University of California study where 43% of mitigation projects were rated as successful. The Indiana study referenced a South Florida study where only 2% of mitigation sites were considered successful and another 6% of mitigation sites were rated partially successful.

Finally, in this study, 35% of permittees complied with mitigation monitoring requirements. In the USFWS study 33% of permittees complied with mitigation monitoring requirements.

A) Mitigation Ratios

Regulatory staff used the 1.5:1 ratio in “typical” situations and used 2:1, or slightly higher ratios, in “non-typical” situations. The use of mitigation ratios seems to have been fairly consistent across the State. New mitigation rules (which became effective April 27, 2000) set standard mitigation ratios at 5:1 for rare wetlands, 2:1 for forested wetlands, coastal wetlands, and wetlands that border on inland lakes, and 1.5:1 for all other types. These ratios apply when the mitigation will be of a similar ecological type as the impacted wetland. Mitigation ratios may be increased when the replacement wetland is of a different ecological type than the impacted wetland. The new mitigation rules will improve program consistency while not significantly altering the size of most mitigation projects

B) On-site vs. Off-site Mitigation

The vast majority of mitigation projects (76%) evaluated during the study were constructed on the same site as the impacted wetlands (on-site). Regulatory staff appeared to require on-site mitigation whenever there was available (non-developable) uplands. Little consideration appeared to be given to the suitability of the available uplands to support wetland hydrology and vegetation. It appears that off-site mitigation was used primarily when the required mitigation acreage was larger than the project site could accommodate. This preference for on-site mitigation contributed to the poor quality of many mitigation wetlands. Requiring on-site mitigation often resulted in wetlands being constructed in poor locations. Often the new wetlands are totally surrounded by developed areas where the only available hydrology is from urban runoff (i.e., developed areas such as parking lots and residential subdivisions). The wetlands often have poor water quality that directly affects the vegetative community. These mitigation wetlands often have limited value for wildlife.

It appears that the historic emphasis on constructing mitigation on-site, while well intended, has been responsible for many unsuccessful mitigation efforts. The language in the new mitigation rules and guidance directing regulatory staff to place greater emphasis on siting mitigation wetlands where they are most likely to develop successfully will improve the quality of mitigation wetlands.

C) Permit Content

Many of the permits evaluated during the study made reference to creating replacement wetlands within the “permitted activity” section of the permit. However, on many of these permits, there was no follow-up reference to these requirements in the permit conditions. While referencing mitigation wetlands may be appropriate within the permitted activity section, all mitigation requirements must be stated as permit conditions. Simply referencing “mitigation wetlands to be created” in the permitted activity section does not clearly obligate the permittee to construct them. Reference to constructed or mitigated wetlands in the permitted activity section only implies that a permit was necessary for their construction.

The sophistication and complexity of permit documents evaluated during the study varied considerably throughout the State. As stated above, some permits contained nothing more than a reference to mitigation wetlands in the permitted activity section, with no mitigation related permit conditions. Other permits contained significant numbers of mitigation specific conditions. While it is understandable that larger, more complex mitigation projects may have more mitigation related permit conditions, all permits requiring wetland mitigation should contain basic mitigation related permit conditions.

a. Required Mitigation Permit Conditions

While regulatory staff should retain the flexibility to customize permit conditions (or even develop new conditions) to meet special situations, every permit should contain conditions that address each of the following basic mitigation issues:

(1) Mitigation Acreage

This permit condition should state exactly how much wetland is being lost and exactly how much wetland must be created. This condition should also specify the amount of each wetland type to be created.

(2) Mitigation Plan

Each permit should reference a specific mitigation proposal that contains construction plans and narrative or a requirement to submit and obtain approval for a plan prior to construction of the project. This condition should reference who prepared the plan and its design date. What an approved mitigation plan should include is covered under Item E in this Chapter.

(3) Mitigation Revisions

This permit condition should state that any deviations from the approved mitigation plan must be approved by the MDEQ in writing prior to construction.

(4) Conservation Easement

This condition must specify the size of the area being placed under the conservation easement. This condition should also state that the easement document must be obtained by the MDEQ prior to permit issuance or submitted by a specified date. The easement should specify prohibited activities.

(5) Financial Assurances

Each permit must specify the dollar amount of the financial instrument. This condition should require that the financial assurance documents be provided to the MDEQ prior to permit issuance and clearly state that the MDEQ can utilize the funds to insure compliance with all permit conditions.

(6) Transfer of Financial Assurance

This condition should require that prior to transfer of a permit, the “new entity” must obtain a financial assurance that is acceptable to the MDEQ. The condition should require the new financial assurance to be in the name of the “new entity” and be for the same amount as the financial assurance obtained by the original permittee.

(7) Mitigation Completion Date

Every permit must specify a date by which all facets of the replacement wetland’s construction must be completed or require submittal and approval of these dates as part of a mitigation plan submitted by a specified date prior to the construction of the project. This includes land balancing, placement of hydric soils, vegetative plantings, and placement of wildlife habitat structures.

(8) Notification of Mitigation Completion

This permit condition should require the permittee to notify the MDEQ in “writing” that the mitigation construction is completed.

(9) “As Built” Mitigation Plan

This condition should require the permittee to prepare and submit “as built” plans of the constructed wetlands. This condition should require the engineer to seal the plans and certify that the construction has met all permit requirements and conditions. A specific deadline or timeframe should be stated for their submittal.

(10) Monitoring Requirements

This permit condition should require the permittee to prepare and submit an annual monitoring report to the MDEQ. The monitoring report should contain the number of years of monitoring required and a standard annual deadline date for submittal. It is recommended that the standard monitoring timeframe be five years with an annual deadline date of November 1. A three-year monitoring requirement may be appropriate for smaller projects or projects with a high probability of success. Monitoring may be terminated once the mitigated wetland achieves and maintains its designed performance standard.

(11) Corrective Actions

Each permit should obligate the permittee to make all reasonable corrective measures deemed necessary by the MDEQ to assure successful development of the mitigation wetland. This condition should set a timeframe after which corrective actions can be required and specify what type of activities the permittee may be required to perform.

(12) Final Certification

This permit condition should obligate the permittee as the responsible party for the mitigation area until the MDEQ certifies the mitigation wetland as acceptable. This condition should specify the actions the permittee must complete prior to requesting certification and what information must be submitted with the certification request.

(13) Abandoned Wetland Project

This permit condition should obligate the permittee as the responsible party for constructing the mitigation wetlands if the permitted project is started but not completed.

D) Mitigation Plan

In a general sense, the mitigation plan should contain information detailing: 1) why the site was chosen, 2) the existing conditions, and 3) the proposed alterations needed to make it a wetland.

Review of the 76 permit documents and their related mitigation information revealed that significant differences exist across the State as to what is considered an acceptable mitigation plan. While some permits referenced a specific mitigation document that contained detailed plans and specifications, others simply stated the need to create a specific amount of wetlands to offset those being destroyed. In most cases where a mitigation plan had been received, it was “conceptual” in nature and contained very little or no specific hydrological data to document that the site could be converted into a wetland.

Conceptual mitigation plans should only be acceptable when the mitigation is completed “up front” (i.e., before initiating the permitted wetland impacts) or if it is followed up with a complete mitigation plan. No examples of “up front” mitigation were found in the projects evaluated during this study.

A standard mitigation plan should include the following general items before being acceptable to the DEQ:

- 1) Introduction
- 2) Description of the impacted wetland
- 3) Goals of the mitigation project
- 4) Justification for site selection

- 5) Description and “to scale” drawings of the existing site conditions
- 6) Discussion of proposed construction activities and “to scale” drawing for the project
- 7) Discussion of proposed soil amendments
- 8) Discussion of wetland vegetation establishment
- 9) Discussion of expected hydrology
- 10) Wildlife habitat improvements
- 11) Schedule for all mitigation related activities
- 12) Performance Standards for wetland development
- 13) Invasive Plant and Animal Management
- 14) Monitoring requirements and schedule
- 15) Long-term Protection
- 16) Financial assurances

E) Performance Standards

Performance standards are the criteria by which the created wetland will be evaluated to determine whether the mitigation requirements have been met. Of the 76 permit documents reviewed during the study, very few contained what could reasonably be considered performance standards. Most permits specified only the amount of wetlands to be created and sometimes the specific type of wetlands to be created. While the size and type of the mitigation wetlands can be considered general performance standards, none of the permits examined contained any specific criteria regarding vegetation or hydrology by which the mitigation wetland could be judged for success or failure.

In conducting the study, one of the most difficult issues to deal with was “what constituted a successful mitigation project.” The only consistent “performance standard” found in the permits examined was the size of the wetland to be created. Therefore, the primary criteria used in the study to determine success was whether the mitigation wetland met the definition of a wetland (under Part 303) and whether it was the correct size.

The practice of including no specific performance standards, or only very general performance standards (regarding the size and possibly the type of wetland to be constructed), resulted in many unenforceable permits and contributed to the poor quality mitigation wetlands. Wetlands dominated by a single species such as a monotypic cattail stand or containing a preponderance of invasive wetland species such as reed canary grass are technically successful. If MDEQ staff attempted to have modifications or corrections made to a mitigation site, the general language of many permits would make enforcement difficult at best.

Model performance standards are needed for the typical elements of all mitigation projects. Performance standards should clearly notify the permittee of their obligations while at the same time informing them of the criteria by which the project will be judged. Performance standards will also provide the MDEQ with specific measures for determining success and justification to require corrective action (or enforcement) when the standards are not met.

Model performance standards should have the flexibility to address regional or site specific issues. Model performance standards are needed for the following elements:

***See appendix J for model performance standards to be used on permits. ***

1) Size and type of the wetland to be created.

This standard should specify the total amount of each wetland type to be created (i.e., emergent, scrub shrub and forested).

2) Soil amendments

This performance standard should identify the specific type of soil to be placed within the mitigation area (i.e., organic soil, hydric topsoil or non-hydric topsoil, etc.) and the depth of soil to be placed. As a rule of thumb, six inches of top quality soil is recommended to ensure a good growing medium. Some areas of the created wetland may be intentionally omitted from the soil requirement to discourage revegetation.

3) Water Quality

This performance standard should prohibit oil, grease, trash, debris, and any other contamination within the created wetlands.

4) Habitat Structures

This performance standard should specify the number and type of wildlife habitat structures required within the created wetland. Habitat structures are a critical element of natural wetlands that are over-looked on most mitigation proposals. Structures such as snags, brush piles, stump islands, and nest boxes often provide critical habitat essential to many wetland species. The specific type of structure will vary depending on the type of wetland being constructed.

5) Invasive species

This performance standard should prohibit common invasive species from comprising a significant percentage of the vegetative community. The most common invasive species (for a given area) should be mentioned in the performance standard. However, the performance standard should be written so that it is not limited to only those species listed.

6) Hydrology

This performance standard should specify the minimum and maximum water levels required during various periods of the growing season. It is recommended that the growing season be defined as beginning on April 15 and ending on October 15. It is also recommended that hydrological monitoring requirements be set for two periods within the growing season. A spring/early summer period

running from April 15 until June 30, and a late summer period running from July 1 through October 15. Monitoring wells and/or staff gauges should be required within the wetland for monitoring purposes. It may also be desirable to require a specific number of days that the wetland must meet a minimum hydrological goal.

7) Vegetation

This performance standard should specify the minimum percent cover by wetland species, minimum number of wetland species established and a minimum density of wetland shrubs or trees found within the mitigation wetland.

It is important to note that the performance standards for hydrology and vegetation will vary depending on the type of wetland to be constructed. Emergent, scrub-shrub and forested wetlands all have different hydrological and vegetative requirements.

Creating scrub-shrub and forested wetlands is difficult, takes long periods of time and is rarely successful. In fact, not a single example of a successfully created scrub-shrub or forested wetland was found during this study. Emergent wetlands on the other hand are easier to construct, quicker to develop, and can be successfully created more often than other wetland types. Therefore, each wetland type will need a specific set of performance criteria

F) Monitoring

The mitigation plan should set forth the specific monitoring data to be collected, the methods and procedures used to collect the data and the timeframes during which the data will be collected and submitted to the MDEQ. The permittee should outline how he/she will document that the performance standards and ultimately, the mitigation requirements have been met.

Sixty-six of the 76 permits reviewed during the study (87%) contained a condition requiring that the mitigation wetlands be monitored. The monitoring condition was the most commonly used mitigation condition. A standard monitoring condition has existed for many years and is most likely the reason for its routine use. This condition has been modified in some districts to require more specific information but is fairly uniform throughout the State.

There were significant differences found among the permits studied regarding the required length of the monitoring period, deadline dates for submittal of the annual reports and follow-up action taken (based upon the information contained within the monitoring reports). Most monitoring reports received by the MDEQ are similar in format and generally contain useful information. However, because the standard monitoring condition does not specify the methods and procedures to be used to obtain the data, the accuracy and usefulness of the data varies considerably.

While the length of the required monitoring period varied, most were either three or five years in length. The standard monitoring period used in the majority of permits was five years. Deadlines for submittal of the annual report varied as well with most being required in the fall or early winter. The most significant difference found among MDEQ districts appeared to be in the follow-up action taken as a result of information contained within the monitoring report, or the failure of the permittee to submit the required monitoring report(s).

Of the 66 permits evaluated that required annual monitoring, only 21 (35%) permittees were found to be in compliance with the monitoring requirements. In the vast majority of cases where the permittee failed to submit the required monitoring reports, MDEQ staff took no action to obtain the information or pursue enforcement. MDEQ staff was largely dependent upon the voluntary compliance of the permittee for submission of a monitoring report. However, even in cases where the monitoring reports were submitted and significant problems were identified, MDEQ staff generally failed to take follow-up action.

The content and format of mitigation monitoring reports was generally not viewed as a significant problem or issue during the study. However, standardizing the data required, the methods used to collect the data, and the time frames for the monitoring period would result in more consistent and useful information being received from permittees. A monitoring report should include the following standard elements:

1) General Information

This section should consist of an overview of the history of the project. Information such as the permit number, date of permit issuance, size and type of wetland lost, and the size and type of the required wetland mitigation should be noted.

2) Project Location and Description

This section should provide a written description of the location of the mitigation project and a map with the project location clearly identified. This section should also include a detailed description of the project's construction and how it is designed to function.

3) Mitigation Monitoring Requirements and Performance Standards

This section should list the specific monitoring requirements and performance standards from the permit and/or approved mitigation plan. Typical information provided here would include the size and type of the mitigation wetland required, deadline for completion, length of monitoring required, the specific elements to be studied (i.e., hydrology, vegetation, soils, etc.) and the time periods during which the monitoring must occur.

4) Methods

This section should include a detailed description of the specific methods used to collect the hydrological, vegetative, soils, water quality, and wildlife data contained within the monitoring report.

5) Schedule

This section should include a schedule of when the hydrological, vegetative, soils, water quality, and wildlife data will be collected.

6) Data Collected and Results

This section should contain the raw data collected during the monitoring period along with the dates and times of collection and an explanation of what the data means.

7) Results Vs Performance Standards

This section should list each performance standard, discuss the data collected during the monitoring period and provide a detailed explanation as to whether the constructed wetland is proceeding towards meeting, has met or is failing to meet each performance standard.

8) Problems Encountered and Corrective Measures

This section should provide a detailed discussion of all problems discovered, their likely cause(s), and the suggested corrective measures needed. A reasonable timetable to implement the corrective measures should be included.

9) Photographic Log

This section should include photographs of the wetland area during construction to document that all required activities were completed. Photographs clearly showing that hydric soils were placed and vegetation was planted are examples of such photographs. Photographs should be taken from designated locations each year to document the development of the wetland and changes observed from the previous monitoring reports. A site plan showing the designated photo locations should be provided.

10) Summary/Conclusions

This section should summarize the development of the constructed wetland area (since construction) and compare the current data to the data from all previous years. This section should also discuss whether the performance standards are being met and whether any corrective actions are needed.

*** See Appendix K for a model Mitigation Monitoring Plan.***

G) Financial Assurances

Financial assurances (i.e., performance bonds, letters of credit, etc) are a mechanism available to the MDEQ to improve the likelihood that mitigation wetlands will be constructed, monitored, modified if necessary and certified as required in the permit. Historically, financial assurances have not been widely used by MDEQ staff. Staff's unfamiliarity with financial instruments and the additional time and effort needed to obtain them are the primary reasons for their limited use. Mitigation rules that allowed for the use of financial assurances "if agreed to by the applicant" may also have been a contributing factor.

Only 9 of the 76 permits (12%) reviewed during the study contained a condition requiring that financial assurances be provided. Of these 9 projects, the financial assurance was actually provided in only three cases. Issuing a permit prior to obtaining the financial assurance and the lack of follow up on mitigation projects (after permit issuance) were the primary reasons for poor compliance.

The use of financial assurances is one area where a significant regional difference was observed. Five of the 12 permits (41%) evaluated from the Upper Peninsula required financial assurances. Only 4 of 64 permits (6%) evaluated from the Lower Peninsula required financial assurances. However, of the 9 permits that required financial assurances, only 3 were actually submitted. Of the 3 submitted, two were rated as successful with high overall scores. The third project resulted in a permit violation where the financial assurance aided in obtaining corrective action.

The use of financial assurances has the potential to significantly increase the effectiveness of the MDEQ's wetland mitigation program. The new mitigation rules [R 281.925 Rule 5 (9) (10)] now in effect provide MDEQ staff with the ability to require financial assurances for all mitigation projects. However, the DEQ currently lacks the authority to draw on these financial instruments. The MDEQ is seeking the necessary authority and has initiated efforts to develop staff guidance and procedures for the use of financial assurances.

H) Physical and Biological Characteristics of the Constructed Wetlands

The evaluation of 76 mitigation projects and their associated individual mitigation sites revealed many common problems from both a physical construction standpoint and from a biological perspective. It also showed that some wetland types could be created quickly and easily while the creation of other types can be extremely difficult and require long periods of time.

1. Hydrology

It would appear that hydrology is the single most critical component when developing a wetland. Mistakes involving soils and vegetation may be compensated for with the appropriate hydrology. Mistakes involving hydrology generally result in failure. Hydrology also appears to be the least understood or least studied aspect of most mitigation projects. Of the mitigation sites evaluated during this study 42% contained excessive water, while 32% contained

insufficient water. Getting the hydrology “wrong” occurred in three out of every four mitigation projects.

Having too much water often resulted in the creation of open water ponds while insufficient water resulted in the creation of upland (non-wetland) conditions. These two conditions represented the most common reasons for failure of the mitigation projects evaluated. Primarily because of hydrological “mistakes”, only 29% of all mitigation projects were successful in creating the required amount of wetland.

Ideally, MDEQ staff should require detailed hydrologic monitoring of any potential mitigation site prior to its acceptance. Unfortunately, it requires several years to gather the data needed to evaluate the site during seasonal and yearly fluctuations. Given the MDEQ’s current 90-day statutory deadline and the timetable for most development projects, it is unrealistic to believe staff will ever routinely have the detailed hydrologic data necessary to properly evaluate a mitigation proposal. However, MDEQ staff should require the submittal of enough hydrological data to adequately demonstrate that the site can and will develop into the type of wetland desired.

2. Soils

Soils are the second most critical element of a wetland mitigation project. During the study only 59% of the mitigation sites were found to have a high quality growth medium in place to facilitate plant growth. Many of the projects with poor vegetative establishment contained poor quality subsoil or clay soils at the surface. These soils are infertile and may severely limit revegetation of the area for many years. Placement of high quality topsoil within a mitigation site is straightforward and should be required in all cases. While organic soil or high quality hydric topsoil is preferred, good quality upland topsoil can be used if necessary. The critical issue is that a high quality growth medium be provided. It is important to establish vegetation very quickly to prevent loss of soil to wind and water erosion. A quick growing annual grass should be established to stabilize the site until the desired wetland vegetation can be established.

3. Vegetation

Many of the mitigation projects evaluated during the study required the planting or seeding of specific species of wetland vegetation. The majority of projects allowed for the natural revegetation of the site. Generally, there did not appear to be an obvious or significant difference in the quality of the vegetated communities. In many cases there was no evidence that the required plantings ever occurred. Mitigation wetlands constructed adjacent to or in close proximity to other wetlands seemed to naturally revegetate satisfactorily. Seeds within the soils (placed within the mitigation area) likely contributed as well. This was a negative influence in areas where the adjacent wetlands (or soils) contained invasive species.

Due to the lack of follow-up on most mitigation projects, it is unknown whether the required planting or seeding was ever undertaken. Therefore, it was not possible to determine whether planting and seeding resulted in a significant improvement over natural revegetation. Based upon the inspections conducted, it appears that natural revegetation is sufficient in most situations. However, where a specific vegetative community is desired (i.e., sedge meadow, swamp white oak forest, etc.) plantings and seeding should be required. The decision to require plantings or seeding will involve site-specific factors and should be made on a case by case basis.

4. Erosion Problems

Serious active erosion was observed in 20% of the mitigation sites inspected. Again, as with the placement of soils, this problem is controllable and is directly related to the permittee not completing the project as required. Erosion problems are generally not significant if discovered early and corrected. However, left untreated a serious erosion problem can degrade water quality and result in the filling of the constructed wetlands. Requiring standard erosion control practices during construction, conducting follow-up compliance inspections, and requiring corrective measures when necessary are actions needed to solve this problem.

5. Poor Water Clarity

Poor water clarity was observed in 26% of the mitigation sites evaluated. Generally the poor clarity of the water was the result of a serious erosion problem, or the fact that the mitigation site was also being used as a retention pond for water quality treatment. Allowing mitigation wetlands to be used for primary water quality treatment is not compatible with their intended purpose. While a natural function of most wetlands is to remove sediments and nutrients from runoff, they can be easily overloaded and damaged. Mitigation wetlands designed to function as retention ponds (for water quality treatment) generally result in poor quality wetlands with very turbid water and little vegetative establishment.

Mitigation wetlands need the cleanest water available. Runoff from roof tops or vegetated areas will generally be cleaner than runoff from parking lots and roads. In situations where degraded water is used, primary water quality treatment should be provided prior to discharge into the wetland. In other words, instead of allowing the mitigation wetlands to be used as retention ponds, retention ponds should be located up-gradient of the mitigation wetlands. Mitigation wetlands should not be allowed to function as primary water quality devices.

6. Invasive Species

Only 8% of the mitigation sites were found to have a problem with invasive species. Invasive species were considered a problem when they constituted 10% or more of the vegetative community. While not considered a significant problem statewide, invasive species were a problem in some locations. When invasive species become a problem, they can be treated with herbicides or manually removed. These methods, while effective in the short term, are

expensive, time consuming and not generally effective in the long run. Effective treatment for invasive species will depend on the species present and other site-specific issues.

Care should be taken before siting mitigation wetlands adjacent to, or within close proximity to, wetland areas containing significant populations of invasive species. Generally, it is easier to prevent the establishment of invasive species than to control or eliminate them once they have become established. Off-site mitigation may be a better alternative than constructing replacement wetlands on a site where invasive species are an existing problem. Care should also be taken to avoid using soils within the mitigation wetland from sites where invasive species are a concern.

While it may be impossible to prevent the establishment of invasive species in some areas, reasonable precautions should be taken to prevent them from becoming a problem. If invasive species do become established, corrective measures undertaken early in the monitoring period are more likely to be successful.

7. Wetland Types

Only 29% of the mitigation projects evaluated during the study were considered biologically successful. Every biologically successful project resulted in the creation of emergent wetlands. The study did not find a single example of a successfully constructed scrub-shrub or forested wetland. These results are not surprising emergent wetlands develop faster and are much easier to construct. In a sense, when constructing emergent wetlands there is much greater room for error. Emergent wetlands can develop in hydrological conditions ranging from saturated soils to water depths of 12 to 18 inches. The water can be seasonal or permanent. Scrub-shrub and forested wetlands on the other hand are difficult to create primarily because they develop only under very specific hydrologic conditions. Scrub-shrub and forested wetlands can only tolerate flooding for limited periods (less than 90 days). Long-term inundation will drown the shrub and tree species common to these wetlands.

Emergent wetlands can successfully develop within a two to three year period, while scrub-shrub and forested wetlands may take many years to become established. The average age for the mitigation projects evaluated during the study was 3.16 years. Even though the majority of the projects evaluated were between one and three years old, 21 projects (32%) were between 4 and 10 years old. Overall, the length of time since construction does not appear to be a factor in most failures. While a few proposed scrub-shrub and forested wetland mitigation projects developed into emergent wetlands (and may eventually evolve into forested systems), most lacked the necessary hydrology and resulted in uplands.

As previously stated, hydrological information is critical to the success or failure of virtually every mitigation project. When replacing scrub-shrub or forested wetlands this hydrological information is even more critical. This becomes significant because in most circumstances the MDEQ requires "in kind"

replacement for the impacted wetlands. This means when forested wetlands are impacted by a project, the replacement wetlands must be forested as well. In Michigan, forested wetlands comprise the largest segment of wetland types, and the most commonly impacted wetland type.

I) Programmatic Issues

The study clearly revealed that Michigan's overall wetland mitigation program as well as the quality of most mitigation wetlands is poor. While there are many factors that contribute to this, the following programmatic items stand out as the major contributing factors:

- 1) The statutory 90-day deadline contained within Part 303.
- 2) The requirement for "in kind" replacement for impacted wetlands.
- 3) The preference for on-site mitigation as opposed to encouraging off-site restoration of historic wetlands.
- 4) The lack of comprehensive mitigation plans or in some cases, no mitigation plan at all.
- 5) The lack of adequate record keeping and tracking of permits requiring wetland mitigation.
- 6) Limited follow-up compliance inspections of the permitted project or the required wetland mitigation.
- 7) The lack of a certification process whereby a permittee receives final approval of a mitigation project that "officially closes a file."

V. RECOMMENDATIONS

This section provides specific and detailed recommendations for improving the mitigation program.

A. New Mitigation Rules

The development of guidance and procedures to assist regulatory staff to effectively and efficiently implement the new wetland mitigation rules should be completed. The mitigation rules that became effective on April 27, 2000, have the potential to vastly improve the MDEQ's wetland mitigation program. The rules identify specific elements that now must be included within a mitigation plan. It is these new requirements, such as performance standards, a monitoring plan, a schedule for completion, financial assurances, and provisions for long-term management and protection of the mitigation site that will potentially lead to the most significant improvement. However, procedures need to be developed and guidance provided to staff so that these rules are administered consistently throughout the State.

B. On-Site Mitigation vs. Off-Site Mitigation

Greater emphasis should be placed on siting mitigation wetlands where they are most likely to succeed and provide the greatest environmental benefits.

C. Permit Issuance

A complete mitigation plan should be received and approved prior to permit issuance or as a permit condition be required to be submitted prior to commencement of any project construction activities.

D. Permit Composition

Standard mitigation specific permit conditions should be developed and used in every permit issued involving wetland mitigation.

E. Mitigation Plan

Criteria should be developed that detail what must be included in an acceptable mitigation plan.

F. Performance Standards

Model performance standards for evaluating the success of mitigation projects should be developed and used on all permits. Separate performance standards should be developed for emergent, scrub shrub, and forested wetlands.

Performance standards are the criteria by which replacement wetlands are evaluated to determine whether the mitigation requirements have been met. See Appendix J for a list of recommended performance standards.

G. Monitoring

Standard criteria, methods and reporting format to be used by permittees in the monitoring of mitigation wetlands should be developed. Long-term monitoring should be required for all mitigation sites.

One of the key elements of a mitigation plan involves the monitoring requirement. The standard monitoring period should be five years in duration. A three year monitoring program may be appropriate for small mitigation projects or projects where the chance of success is very high (i.e., restoration of a historic wetland).

H. Financial Assurances

The Department should complete the process of obtaining the authority to draw on financial assurances. The procedures and guidance currently being drafted to assist staff in obtaining financial assurances from permittees should also be completed.

I. Wetland Restoration

Potential mitigation sites should be evaluated more closely to ensure the success of mitigation and wetland restoration should be required whenever possible.

Many of the highest quality mitigation projects evaluated during the study were sited in upland areas that historically had been wetlands. The level of success and the quality of the constructed wetlands were considerably higher when historic wetlands were restored back to their original wetland conditions.

Applicants should be required to locate potential mitigation sites that were historically wetlands. In many instances these areas can easily and cost effectively be restored to high quality, fully functioning wetlands. Since many wetlands were drained for conversion to agricultural use, they are common statewide.

J. Water Quality Treatment

Mitigation sites should not be used for primary water quality treatment purposes (i.e., detention, retention or sedimentation ponds).

When mitigation wetlands will be receiving water from developed sites, primary treatment of that runoff water is required prior to reaching the created wetland. Construction of a retention pond up-gradient of the mitigation wetlands is recommended.

K. Water Control Structures

Adjustable water control structures should be considered for mitigation sites.

L. Mitigation Data Entry

Mitigation information should be entered into the CIWPIS database at the time of permit issuance.

In 1999, the MDEQ made modifications to its CIWPIS database that allows staff to enter mitigation-related data. Staff was directed to routinely enter such information on May 7, 1999. (See Appendix L.) The necessity of entering the information needs to be reinforced.

M. Location of Mitigation Files

All permit files requiring wetland mitigation should be retained in the appropriate district office until such time that staff have evaluated the mitigation project and certified it as complete and acceptable.

N. Follow-up Inspections

Compliance inspection of mitigation sites should be a part of each District's compliance effort. Violations should be prioritized for compliance/enforcement follow-up. Timely and appropriate enforcement actions must be taken to provide credibility for the mitigation program.

O. Mitigation Certification Process

A "mitigation certification" process that includes release of the financial assurances should be established.

The MDEQ currently has no formal process by which mitigation projects are reviewed for final approval and "certified" as complete. At some point permittees will request that the MDEQ release their financial instruments

P. Wetland Mitigation Banking

The MDEQ should continue to encourage wetland mitigation banking.

The MDEQ established rules authorizing wetland mitigation banking in December of 1997. Michigan's mitigation banking rules require that replacement wetlands be constructed, monitored for at least one year, and then be approved by the department before the credits can be used to offset permitted losses. The banking program represents a significant improvement over current mitigation practices and has the potential to greatly improve Michigan's overall mitigation program. To date, only one banking agreement has been approved and these wetland credits are not

expected to be available until late 2001 or 2002. During 1998 and 1999 the banking program generated little interest. However, during the past year (2000) the MDEQ has received numerous serious inquiries and is anticipating that formal banking proposals will be submitted during the coming year.

The MDEQ should take steps to publicize and encourage Michigan's wetland mitigation banking program.

LITERATURE CITED

Gallihugh, Jeanette L. 1998. Wetland Mitigation and 404 Permit Compliance, Vol. 1 and 2. United States Fish and Wildlife Service. Chicago, IL. June 1998.

Robb, James T. 2000. Indiana Wetland compensatory Mitigation Inventory. Indiana Department of Environmental Management. Indianapolis, IN. May 2000.
