

# PANHANDLE HEALTH DISTRICT I

HAYDEN LAKE

SHORELINE SURVEY

UPDATE - 1986

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DIVISION OF ENVIRONMENT  
COEUR D'ALENE OFFICE

TECHNICAL REPORT  
HAYDEN LAKE, IDAHO  
SHORELINE SURVEY UPDATE  
1976 - 1985

by  
STAFF  
PANHANDLE HEALTH DISTRICT I

March 1, 1986

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PANHANDLE HEALTH DISTRICT I

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## ABSTRACT

Hayden Lake is a pristine body of water that is extremely popular and valued for its many beneficial uses. Numerous recreational subdivisions have been platted, and roughly half the lots have been built upon. At the present time, the majority of these structures are served by individual sewage disposal systems.

The lake has increasing water quality problems that are believed to be partially related to human waste disposal. The geographical areas where the problems are most severe have been tentatively identified but must be confirmed by water quality studies. Once the "hot spots" are located, they will be addressed by local groups via the Hayden Lake Recreational Water and Sewer District.

This report updates the data base that can be used to partially quantify the water quality impact of large numbers of individual sewage disposal systems. It points to the need for additional water quality studies.

## SCOPE OF CONTRACT

The Panhandle Health District was retained by the Idaho State Division of the Environment to conduct an inventory of the number of subsurface sewage systems around Hayden Lake, Kootenai County, Idaho.

The permits were pulled from the annual files and sorted by eleven specific geophysical areas developed in 1976 during the "208" study. These geophysical areas were bays or shoreline segments that naturally segregated themselves into distinct units. Continued use of these units allowed correlation of the new data to the existing data and acted as an index of growth activity by district areas, around the lake. To assure continuity, the complete 1977 Hayden Lake Shoreline Survey is included as an appendix. Since 1975, the Panhandle Health District has issued only drainfields around the lake so the 1977 categories of drywells, cesspools, privys and holding tanks have not changed.

The new permit data was collated with the 1977 data pertaining to distances and slopes of the disposal areas to the surface water. Complete soils data from the Soil Conservation Service was not available so the PHD hand tallied the soil type by testhole results from permit issuances. This was developed into a soil table representing each of the eleven areas. This table complements the table addressing the types of systems and the table addressing the total number of systems, slopes and distances. These items completed Tasks 1 and 2.

Task 3 was to develop a narrative and mapwork. The narrative details the eleven areas around the lake. Because of the level of detail requested and the amount of information compiled, the Health District developed a single large fold out map (4' x 6') to be enveloped in the rear of the report. This map provides greater resolution and can be used for detailed planning efforts and recording of new data. The mylar will be kept on file and updated as the area develops and changes.

## MATERIALS & METHODS

The form of this report is essentially a continuation of the Kootenai and Shoshone Counties Shoreline Survey, Technical Report, completed in 1977. The same format was used to present the data.

We developed a map delineating the eleven areas that the Hayden shoreline was broken into for survey purposes in 1977. The map illustrates the major drainages serving the lake. It also shows the approximate locations of structures as of December 31, 1985.

The soils and geology information was developed by examination of test hole data contained in the permit files and by summarizing the personal experiences of the Environmental Health Specialists who have worked in the area. Limited soils information was obtained from the Soils Survey of the Kootenai County Area prepared by the Kootenai/Shoshone Soil Conservation District.

The information and the number and location of sewage disposal systems was obtained by examining the entire permit inventory from 1976-1985. The permits for Hayden Lake were photocopied and added to the "area files" established in the 1977 survey. The majority of the information needed for this report was obtained from these permits.

Some limited field examination of individual sewage disposal installations was necessary where the information supplied on the permits was inadequate.

The Soil Conservation Service, the Idaho Panhandle National Forest Soils Scientist, the engineering consultant for the Hayden Lake Recreational Water and Sewer District, and the USGS were contacted and interviewed. The data that we received from them is incorporated in the report.

## INTRODUCTION

### DESCRIPTION OF HAYDEN LAKE

Hayden Lake is in north-central Kootenai County, lying in Townships 51 and 52 North, Range 3 West, Boise Meridian. It has a watershed of 41,000 acres that, for the most part, is heavily timbered and lies within the boundaries of the Fernan Ranger District, Coeur d'Alene National Forest, Idaho Panhandle National Forests. A small part of the drainage comes from the "Rimrock" area that lies generally north and west of the lake. This land has been cleared and is currently in limited agricultural uses.

The lake has a surface area of 3,800 acres and has a volume of 10,000 acre feet. The maximum depth is 178 feet; the mean depth is 24 feet. The majority of the northern arm of the lake was created in 1911 when the Hillyard Town Site Company built an earthfill dam across the outlet and raised the level of the water 12 feet. This area and the entry points of the major drainages that serve the lake are prone to aquatic plant growth. The rest of the lake has a water depth that falls rapidly from the shoreline.

The lake shore has been extensively platted. As of December 31, 1985, 653 structures had been built around the lake.

There is one commercial area on the lake centering around Tobler's Marina in Cooper's Bay. This area and three small access points provide for the public use of the shoreline.

## THE SURVEY

### GENERAL DATA

In 1976 the Panhandle Health District completed a shoreline survey that was published in April of 1977. For data management purposes, the populated areas of the lake were broken down into eleven areas. These run in a clockwise manner around the lake beginning at the dike at the southwest corner. A description of these survey zones is as follows:

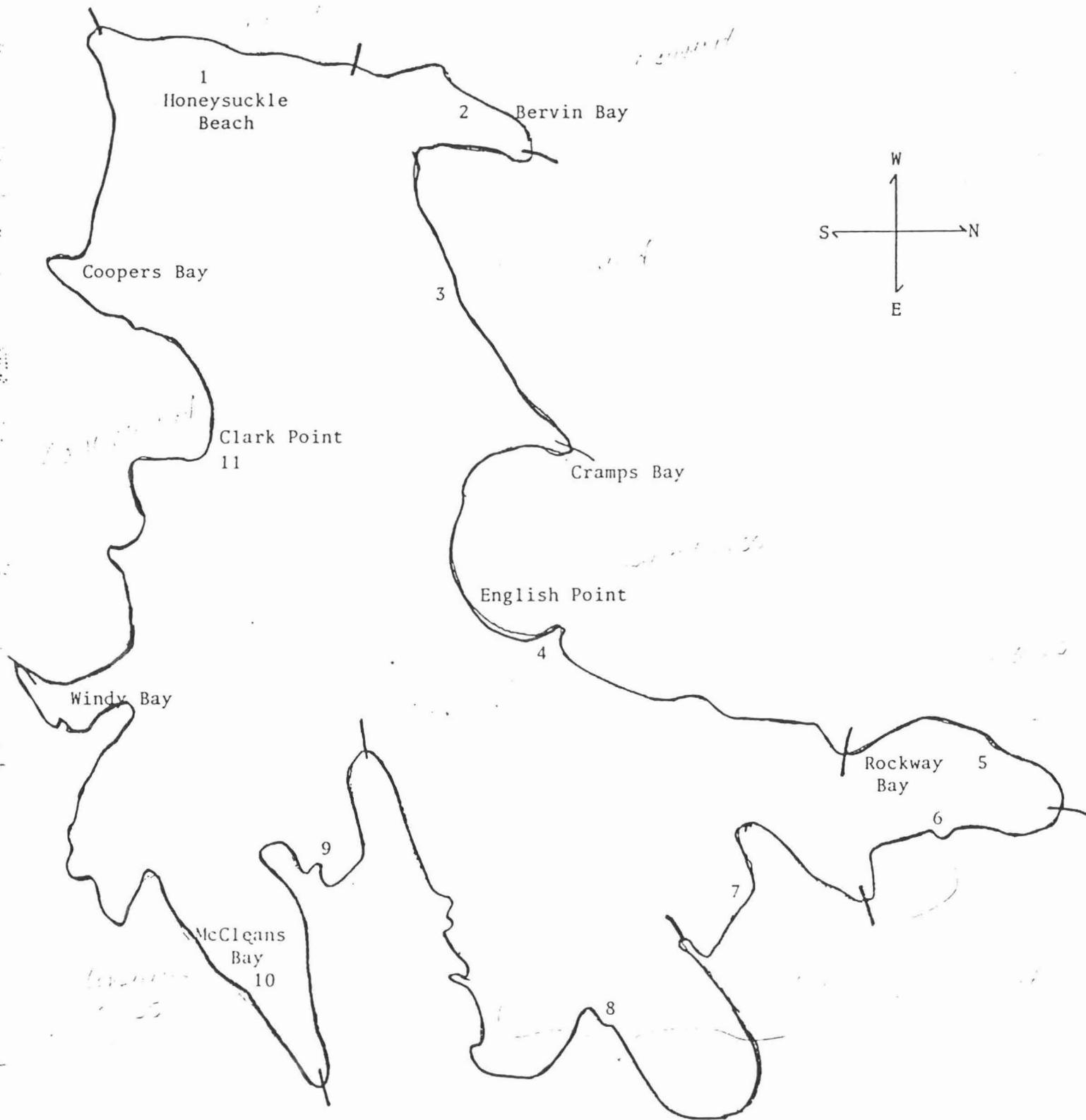
1. Honeysuckle Beach to the Hayden Lake Country Club
2. Hayden Lake Country Club to Bervin Bay
3. Bervin Bay to Cramps Bay
4. Cramps Bay to the Gonzaga Property (Rockway Beach)
5. Rockway Beach to Hayden Creek
6. Hayden Creek to Skinner Bay
7. Skinner Bay to Chicken Point
8. Chicken Point to Yellowstone Point
9. Yellowstone Point to Yellowbanks Creek (Sunset Beach)
10. Yellowbanks Creek to Windy Bay
11. Windy Bay to Dike (Honeysuckle Hills)

These survey areas are delineated on the map in the folder at the back of this report. The 1976 survey report is contained in Appendix D.

### SPECIFIC AREA DATA

The purposes of the 1986 survey are to report on what has occurred along the shoreline in the last ten years and to update the data that was collected in 1976. This was done using the same eleven geographical areas previously mentioned. The narrative descriptions of these areas are as follows. Data summaries of each area are included in Appendix A and B.





HAYDEN LAKE  
AREA MAP

#### AREA 1

The total number of individual sewage systems in this area is 36. Since 1976 there have been two new installations and seven either repaired or renovated. In 1976 the average distance between surface water and the disposal system was 151 feet. This has increased to 178 feet in 1985. The average distance between surface water and disposal areas for the sewage systems installed in this ten year period was 258 feet. The slope of the land averages 10.5 percent and the average height of the sewage system above the lake is 15 feet.

The soils in this area are generally sands and gravels that present few problems from the standpoint of drainage. The rapid permeability, however, has the potential to allow inadequately treated effluent to move through the soil profile and into the lake or the water table.

There are intensive uses of the lake for public water supply and irrigation in this area. The Hayden Lake Irrigation District, the Markhouse Water Association, the City of Hayden Lake, and two individuals collectively represent 656 water connections withdrawing water from this area. The city of Dalton Gardens also draws its irrigation water from this area.

One of the public access points (Honeysuckle Beach) is located in this area. It is very heavily used by swimmers and boaters in the summer months.

This area will be sewered by the Hayden Lake Recreational Water and Sewer District within the next two years.

#### AREA 2

The total number of sewage disposal systems in this area is 35. Since 1976, there have been two new installations and seven either repaired or renovated. In 1976 the average distance between surface water and the disposal system was 154 feet. This increased to 170 feet in 1985. The

average distance between surface water and disposal systems installed in this ten year period was 245 feet. The average slope of the lots was 49 percent with sewage systems approximately 75 feet above the lake. Most of the homes are built on flat to gently sloping benches or terraces above the lake. The shoreline is extremely steep.

There are two general types of soil in this area. From the Hayden Lake Country Club to Bozanta Tavern Bay, where drainage from Avondale Lake enters Hayden Lake, the soils are sand and gravel. They are very porous and present very few problems from the standpoint of drainage. The rapid permeability, however, could allow inadequately treated waste water to move through the soil profile and into the water table, the lake, or the creek. The soils change radically at Bozanta Tavern Bay. Basalt bedrock appears as cliffs and outcroppings along the lake. The soils are shallow, silty clays, ranging in depth from nonexistent near the lake to 48-72 inches near the Hayden Lake Road. There is a shallow, laterally moving seasonal water table throughout this area that terminates in springs near the shoreline. These springs have the potential for carrying partially treated sewage into the lake since the disposal systems are located in or very near the saturated zone during the wet seasons. This area is known as Wright's Park. A small subdivision called Bervin Bay Terrace developed recently near the northern end of this area, but building on this plat cannot occur unless a connection to a nearby community disposal system is purchased.

One public access point exists in this area, but it is very lightly used due to the lack of parking.

This area will be sewered by the Hayden Lake Recreational Water and Sewer District within the next two years.

### AREA 3

The total number of individual sewage disposal systems in this area is 30. Since 1976 there have been six new installations and two either repaired or renovated. In 1976 the average distance between surface water and the disposal area was 117 feet. This increased to 147 feet in 1985. The average distance between surface water and disposal systems installed in this ten year period was 230 feet. The average slope of the lots was 53 percent with sewage systems approximately 61 feet above the lake.

The soils in this zone are shallow, silty clays over basaltic bedrock. The soil depth sometimes increases with the distance from the lake, but not always. There is a shallow, seasonal water table throughout much of this area that terminates as springs near the lakeshore. The shoreline is steep with numerous rock outcroppings. Where no natural benches exist, homesites have been created by terracing the lots near the lake. Older sewage systems were generally installed in these terraces and the waste water can drain directly into fissured rock.

A private sewage disposal system has been installed to serve 14 lots in the Point Hayden subdivision. These connections were not used in the tally of the individual sewage systems along the lake. The effluent from the houses served by this system is pumped to a community drainfield that is a considerable distance from Hayden Lake. Additionally, the Point Hayden area will be served by the Hayden Lake Recreational Water and Sewer System within the next two years.

The Split Rock subdivision is generally very steep with limited soil cover. The Health District will not allow new sewage systems in this area but must accommodate repairs when existing systems fail.

Fifteen individuals use the lake as a source of drinking water.

#### AREA 4

The total number of sewage disposal systems in this area is 49. Since 1976 there have been three new installations and two either repaired or renovated. In 1976 the average distance between surface water and the disposal area was 76 feet. This increased to 89 feet in 1985. The average distance between surface water and disposal systems installed during this ten year period was 200 feet. The average slope of the lots was 42 percent with sewage systems approximately 33 feet above the lake.

The soils in this area are shallow, silty clays to clays. The depth of the soils generally increases with the distance from the lakes, but not always. Basaltic bedrock and hard, white clays underlie the more porous upper soil profiles. These seldom exceed 60 inches in depth. Laterally moving, shallow, seasonal water tables are common in this area and terminate as springs along the shoreline. The shoreline is steep with numerous rock outcroppings. Near Evernade Point and in other limited local areas, the terrain is gently sloping but, as a rule, homesite development has consisted of artificially terracing steep hillsides. In the past, sewage systems were installed on these terraces very close to the lake.

No permits for new construction are issued in this area unless they comply with all of the requirements of Idaho's subsurface sewage regulations. If a lot owner wishes to upgrade or repair an existing system, he or she must come as close as possible to meeting current standards with the sewage facilities.

Forty-five individuals use the lake in this area as a source of drinking water.

#### AREA 5

The total number of individual sewage disposal systems in this area is 92. Since 1976 there have been nine new installations and one either repaired

or renovated. In 1976 the average distance between surface water and the disposal area was 72 feet. This increased to 95 feet in 1985. The average distance between surface water and disposal systems installed during this ten year period was 288 feet. The average slope of the lots was 31 percent with the sewage systems approximately 22 feet above the lake.

The soils in this area are silty clays and clays. They vary greatly in depth, but are generally deeper as the distance from the lake increases. The area is underlain by basaltic bedrock in the vicinity of Rockway Beach. This changes to a granitic formation in the vicinity of Hayden Creek. A hard, white clay is present in the deeper soil profiles throughout this area. A laterally moving, seasonal groundwater table is common throughout this zone, terminating as springs near the shoreline.

The lakeshore lots are generally steep with homesites developed on excavated terraces. Older homes and cabins have sewage systems placed on these terraces.

Permits for new construction must meet all of Idaho's septic tank regulations. Given the soil conditions in the area, this is sometimes hard, if not impossible, to do. Existing homes or cabins may upgrade or repair their systems, but they must come as close to meeting current standards as is physically possible. A county access called Sportsman's Park is located in the Hayden Lake Park plat near the north end of the lake. There is boater access there, but submergent and emergent vegetation may inhibit swimming and other primary contact recreation. The lake is shallow and clogged with vegetation during much of the summer.

Fifty-six individuals obtain their drinking water from the lake in the area.

#### AREA 6

The total number of individual sewage disposal systems in this area is 66. Since 1976 there have been seven new installations and five either repaired or renovated. In 1976 the average distance between surface water and the disposal system was 86 feet. This increased to 115 feet in 1985. The average distance between surface water and disposal systems installed during the last ten years was 243 feet. The average slope of the lots in this area was 29 percent with the sewage systems approximately 25 feet above the lake.

The soils in this area are generally silty loams, sandy loams, sands, and decomposed granite. Where McClean's Creek and other small creeks enter the lake, the bottomland soils are generally impervious clay with a high groundwater table. Small spurs and ridges run throughout the area and on top of these, the soils tend to be shallow. In the remainder of this section, where the decomposing granite has mixed with the silty soils that have washed down from the uplands, a deep, sandy loam exists. These soils tend to be suitable for individual subsurface sewage disposal when other requirements can be met.

The lots in this area are generally steep near the shoreline, but moderate towards the rear. The soil depth is variable and each lot stands on its own merit with respect to suitability for individual sewage disposal. The lots as a whole are not deep enough to meet current Idaho surface water/drain-field separation requirements, so inland easements or land must be acquired to install a sewage system. Permits for repair or renovation of existing disposal systems can be granted, provided that the work comes as close to meeting current standards as is physically possible.

Forty-eight individuals draw their water from the lake in this area.

The water in this area is clogged with aquatic vegetation during much of the year.

#### AREA 7

The total number of individual sewage disposal systems in this area is 48. Since 1976 there have been six new installations and three have either been repaired or renovated. In 1976 the average distance between surface water and disposal systems was 140 feet. This increased to 165 feet in 1985. The average distance for sewage disposal systems installed during this ten year period was 274 feet. The average slope of the lots in this area was 25 percent with the sewage systems approximately 36 feet above the lake.

The soils in this area are generally silty loams, sandy loams, sands, and decomposed granite. In Skinner Bay near the bottomlands and the low-lying areas next to the lake at the Gem Shores subdivision, there are deposits of impervious clay saturated with a high watertable. Small spurs and ridges run throughout the area, and on top of these, the soils tend to be shallow. In the remainder of this section, where the decomposing granite has mixed with the silty soils that have washed down from the uplands, a deep, sandy loam exists. These soils tend to be acceptable for individual subsurface sewage disposal when other requirements can be met.

The lots in this area are generally steep near the shoreline but moderate towards the rear. The soil depths are variable and each lot stands on its own merit with respect to suitability for individual sewage disposal. The lots as they exist are for the most part not deep enough to meet current Idaho surface water/drainfield separation requirements, so inland easements or land must be acquired to install a sewage system. Permits for repair or renovation of older existing disposal systems can be granted, provided that the work comes as close to meeting current standards as physically possible.

Thirty-eight individuals draw their water from the lake in this area.



#### AREA 8

The total number of individual sewage disposal systems in this area is 114. Since 1976 there have been twelve new installations and eight have either been repaired or renovated. In 1976 the average distance between surface water and the disposal system was 98 feet. This increased to 125 feet in 1985. The average distance for sewage disposal systems installed in the last ten year period was 254 feet. The average slope of the lots in this area was 26 percent with the sewage systems installed approximately 26 feet above the lake.

The soils in this area are generally silty loams, sandy loams, sands, and decomposed granite. In the bottomlands east of Mokin's Bay and east of Preston Beach (Jim Creek), there are deposits of impervious clay saturated with a high groundwater table. Small spurs and ridges run throughout the area and on top of these, the soils tend to be shallow. In the remainder of this section, where the decomposing granite has mixed with the silty soils that have washed down from the uplands, a deep, sandy loam exists. These soils tend to be acceptable for individual subsurface sewage disposal when other requirements can be met.

The lots in this area are generally steep near the shoreline, but moderate towards the rear. The soil depths are variable and each lot must stand on its own merits with respect to suitability for individual sewage disposal. The lots as a whole are not deep enough to meet current Idaho drainfield/surface water separation requirements, so inland easements or land must be acquired to install a sewage system. Permits for the repair or renovation of older existing disposal systems can be granted, provided that the work comes as close to meeting current standards as is physically possible.

In this area, 111 people draw or receive their drinking water from Hayden Lake. This includes a community water supply system operated by the Hayden Lake Recreational Water and Sewer District.

#### AREA 9

The total number of individual sewage disposal systems in this area is 30. Since 1976 there have been four new installations and two have either been repaired or renovated. In 1976 the average distance between surface water and the disposal system was 94 feet. This increased to 119 feet in 1985. The average distance for sewage disposal systems installed in the last ten year period was 254 feet. The average slope of the lots in this area was 15 percent with the sewage disposal systems installed 24 feet above the lake.

The soils in this area are generally silty loams, sandy loams, sands, and decomposed granite. Where Yellowbanks Creek enters O'Rourke Bay, there are deposits of impervious clay saturated by a high water table. Small ridges and spurs run throughout the area and on top of these, the soils tend to be shallow. In the remainder of this section, where decomposing granite has mixed with the silty soils that have washed down from the uplands, a deep, sandy loam exists. These soils tend to be acceptable for subsurface sewage disposal when other requirements can be met.

The lots in this area tend to be steep near the shoreline, but moderate towards the rear. The soil depths are variable and each lot must stand on its own merits with respect to suitability for individual subsurface sewage disposal. The lots as a whole are not deep enough to meet current Idaho surface water/drainfield separation requirements, so inland easements or land must be acquired to install a sewage system. Permits for the repair or renovation of older existing disposal systems can be granted provided that the work comes as close to meeting current standards as is physically possible.

In this area, 23 individuals draw their water from Hayden Lake.

#### AREA 10

The total number of individual sewage disposal systems in this area is 43. Since 1976 there have been two new installations and no repairs or renovations. In 1976 the average distance between surface water and the disposal system was 60 feet. This increased to 71 feet in 1985. The average distance for the two disposal systems installed in the last ten year period was 300 feet. The average slope of the lots in this area was 47 percent, with the sewage disposal systems installed 29 feet above the lake.

The soils in this area are generally silty clays, silty loams, sandy loams, and decomposed granite. Where Yellowbanks Creek enters O'Rourke Bay, there are deposits of impervious clay saturated by a high water table. This entire area has very severe slopes with shallow soils and evidence of shallow season water tables that terminate as springs on the lakeshore. It is very difficult to obtain a permit to construct a sewage system in this area due to these limiting factors. The repair of older existing systems is still possible here, but only with very great difficulty due to the severe topography.

In this area, 29 individuals draw their water from the lake.

#### AREA 11

The total number of sewage disposal systems in this area is 110. Since 1976 there have been thirteen new installations and nine have either been repaired or renovated. In 1976 the average distance between surface water and the disposal system was 108 feet. In 1985 this increased to 139 feet. The average distance for sewage disposal systems installed in the last ten year period was 265 feet. The average slope for the lots in this area was 25 percent with sewage systems installed 26 feet above the lake.

The soils in this area are clays, silty clays, silty loams, and decomposed granite. They are commonly very shallow and lay on severe slopes. Laterally-

moving seasonal water tables are present and they terminate as springs near the shoreline. In the vicinity of the Clark House there are moderately sloping lots and some deposits of relatively deep soil, but the movement of subsurface water from Canfield Butte to Hayden Lake is evidenced by springs on the shoreline.

In this area (with the exception noted below), every lot stands on its own merits from the standpoint of suitability for subsurface sewage disposal. The supply of lots that are suitable for new construction is limited by soils, topography, and ground water problems. Permits for the repair of existing older sewage systems are still possible to obtain, provided that the drain-field is placed as far from surface water as is physically possible. A public sewer is available between Tobler's Marina at Cooper's Bay and the dike road at the western end of the lake. Mandatory connection at the time of new construction or system failure is currently required. This area will be entirely sewered by the Hayden Lake Recreational Water and Sewer District within the next two years.

In this area 90 individuals draw their water from Hayden Lake.

#### SUMMARY

The totals and averages for the combined areas paints a somewhat descriptive picture of the status of individual sewage disposal systems on Hayden Lake. There are 653 individual sewage disposal systems. Of these, 66 are new construction (within the last ten years), 43 have been repaired or renovated, and 544 remain essentially as they were in 1976. Due to stricter enforcement of Idaho's regulations governing the installation of individual septic tank systems, the average distance between disposal areas increased from 115 feet in 1976 to 125 feet in 1985. The average distance between disposal areas and surface water for permits issued in the last ten years was 262 feet. The reason that this figure is not 300 feet or more is that Health

District policy requires that, in the case of a renovation or repair of older existing sewage systems, the drainfield be placed as far as physically possible from the lake. Since the lots at Hayden are seldom in excess of 300 feet deep, the installations are not, and thus the average suffers.

The overall average slope of the lots around Hayden Lake is 31 percent. The range of slope on the lots varies from level to in excess of 150 percent. Oftentimes, a lot may contain a variety of slopes. For instance, a lot may be level at the lake, climb steeply up a rock bluff, and have a gently sloping bench to its rear boundary. The overall slope average is significant in that it gives a general idea as to where shoreline development stands in relation to Idaho's current regulations which limit installations to slopes of less than 20 percent.

The overall height of disposal areas above the lake again is useful in that when combined with the average disposal site/surface water separation, the distance that effluent must travel through any given soil profile before it reaches surface water can be calculated. Given the rapid permeability of many of the soils on Hayden, the level of treatment given to the waste water as it moves downslope may be anticipated to be minimal. There are also 23 disposal sites that lie adjacent to seasonal water courses.

Finally, the fact that 1,111 individual water service connections are providing drinking water directly from the lake adds a public health significance to the overall quality of the water. During peak use of the lake in midsummer, 2,778 (1,111 x 2.5 people per connection) are drinking lake water, many without the benefit of chlorination or disinfection.

#### RECOMMENDATIONS

The information collected for this report must be combined with further water quality studies to provide a meaningful analysis of the septic tank impacts on Hayden Lake. Task 5 of this project, to be completed by the Division

of Environment, should provide some of the necessary data. The results of this report, and DOE's monitoring under Task 5, should be further expanded to include water quality studies on drainages entering Hayden Lake from agricultural and silvicultural areas. These studies, along with existing information, could then be used to provide an overall picture of water quality and sources of contamination. This information would then provide the basis for prioritizing control efforts.

The Health District has also formally requested that the Soil Conservation District complete a soils evaluation for the Hayden Lake watershed. This information would be of extreme value in reviewing various projects and their potential impacts to the lake.

Finally, with the completion of these studies, enough information should be available to develop a comprehensive watershed management program to provide long range policies for mitigating water quality problems in Hayden Lake.



2 May 86

MEMO

TO: Susan M. and Al M.

FROM: Gwyn B.

SUBJECT: Final Hayden LK. Report

I could not resist reviewing this report and passing the cover letter on for your enjoyment. The PHD has, in fact, addressed all our comments; #s 1, 3, 4 & 6 & 7 directly and #s 2 and 5 by total omission. They have indeed fulfilled their contract obligations and can be paid off.

I have two retorts to Larry's letter. First, our comments ~~are~~ were in response to the <sup>total</sup> information they provided in their report. We did not just pick out the parts specifically noted in the contract. They ran the risk in editorializing and lost. Second, I am at fault for making the original sin of assuming PHD knew & used basic scientific reporting format and style. Our comments, however, were largely technical, not simply editorial as Larry implies.

I have the report if you care to review it. It is succinct, reports data objectively, contains nothing that would relate PHD's efforts to ours in any way (and <sup>other than we paid them for this study</sup> offers no interpretation of the inceptory results as they may



relate to water quality impacts.

We will have to interpret ~~their findings~~ and incorporate  
~~to incorporate them into their findings into~~  
~~in order to design our special study~~ <sup>this</sup> design.  
This could potentially involve me, Mike  
Beckwith, Albert Ogden and maybe <sup>even</sup> PHD  
(if they'd talk to us). Seriously, this report is a  
significant improvement over the first one  
& I will be writing PHD to that effect.

Gwen

cc: Gary Shook  
Ed Gulloch FYI, too