

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

①

FINAL

ADA 124636

QUANTITATIVE REPORT
 UPPER MISSISSIPPI AND LOWER ILLINOIS RIVERS
 POOLS 24, 25 AND 26
 TERRESTRIAL AND AQUATIC LAND USE AND HABITAT CHANGE
 AS A RESULT OF THE NINE-FOOT CHANNEL PROJECT



United States Army
 Corps of Engineers
 ... Serving the Army
 ... Serving the Nation

St. Louis District

DTIC
 ELECTE
 FEB 18 1983
 S D
 E

DTIC FILE COPY

U. S. ARMY ENGINEER DISTRICT

ST. LOUIS

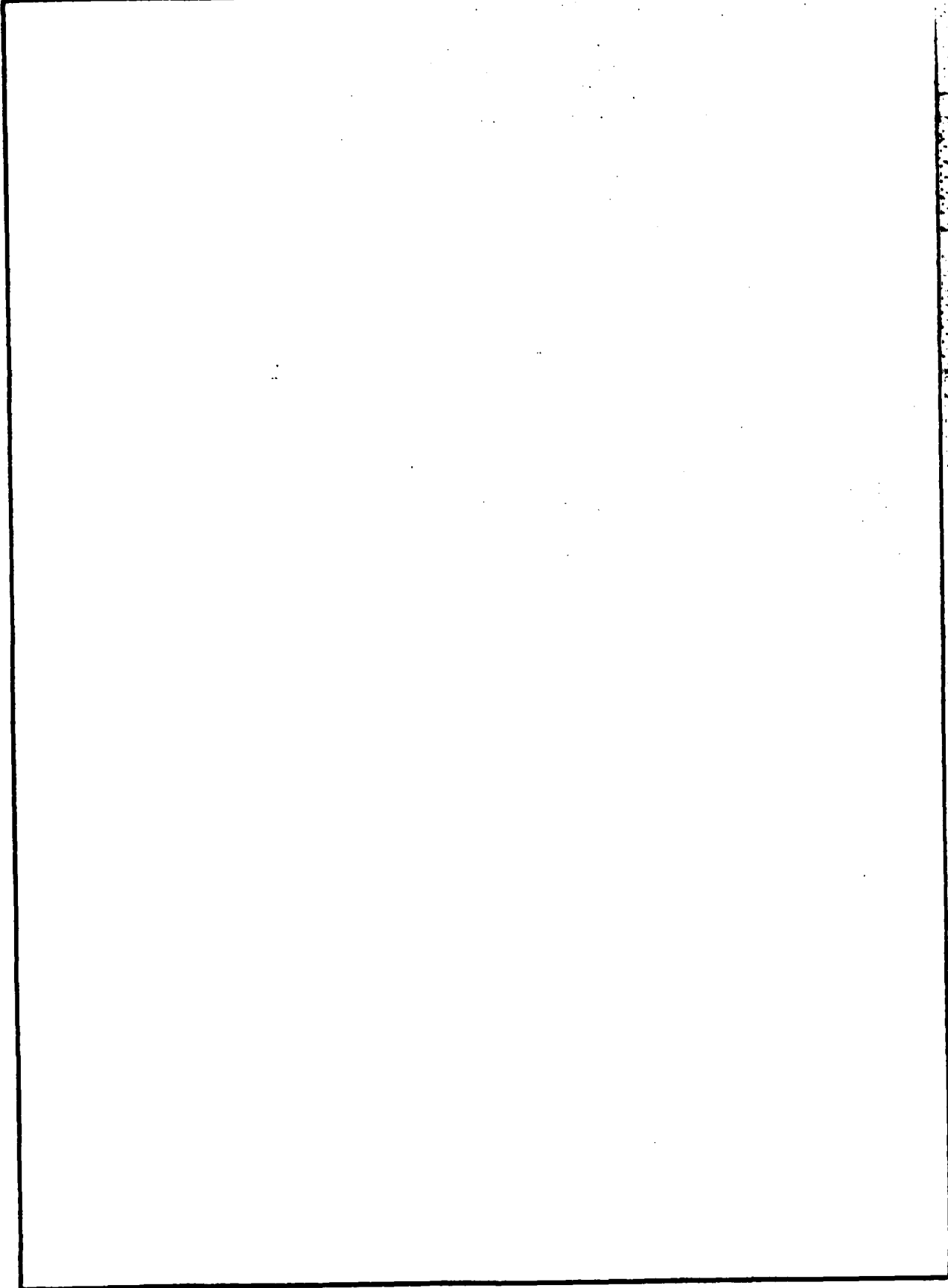
MARCH 1980

This document has been approved
 for public release and sale; its
 distribution is unlimited.

83 02 018 007

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO. AD-A124636	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Terrestrial and Aquatic Land Use and Habitat Change as a Result of the Nine-Foot Channel Project, Upper Mississippi and Lower Illinois Rivers, Pools 24, 25, and 26, Quantitative Report		5. TYPE OF REPORT & PERIOD COVERED Final
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s)		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Army Engineer Dist., St. Louis 210 Tucker Blvd., N. St. Louis, MO 63101		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS		12. REPORT DATE March 1980
		13. NUMBER OF PAGES
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) U.S. Army Engineer Dist., St. Louis 210 Tucker Blvd., N. St. Louis, MO 63101		15. SECURITY CLASS. (of this report) UNCLASSIFIED
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number)		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report contains a quantitative acreage and spatial (map) analysis of the land use and terrestrial and aquatic habitat changes that have occurred as a result of the construction of the nine-foot navigation project in Pools 24, 25, and 26, Upper Mississippi and Lower Illinois Rivers.		

SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)



SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)

FINAL

QUANTITATIVE REPORT
UPPER MISSISSIPPI AND LOWER ILLINOIS RIVERS
POOLS 24, 25 AND 26
TERRESTRIAL AND AQUATIC LAND USE AND HABITAT CHANGE
AS A RESULT OF THE NINE-FOOT CHANNEL PROJECT

U. S. ARMY ENGINEER DISTRICT

ST. LOUIS

MARCH 1980

Accession For	
NTIS GRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By _____	
Distribution/ _____	
Availability Codes	
Dist	Avail and/or Special
A	



SUMMARY

In 1976 the Office of the Chief of Engineers directed the St. Paul, Rock Island and Chicago Districts (North Central Division) and the St. Louis District (Lower Mississippi Valley Division) to prepare a computation of the land use and terrestrial and aquatic habitat changes that have occurred as a result of the construction of the Nine-Foot Navigation project in the Upper Mississippi and Illinois River Valley. The methodologies followed by each Corps District were similar in that each District contracted for photo-interpretation of pre-impoundment and post-impoundment air photography of habitat types and acreage calculation of each land use classification. The land use and terrestrial and aquatic habitat classification are similar allowing for an overall evaluation of changes in the Upper Mississippi and Illinois River Valleys. The report compiled by the North Central Division was released July 1978.

→ This report contains a quantitative acreage and spatial (map) analysis of the land use and terrestrial and aquatic habitat changes that have occurred as a result of the construction of the nine-foot navigation project in Pools 24, 25 and 26, Upper Mississippi and Lower Illinois Rivers. The study area extends from Locks and Dam No. 26, Alton, Illinois (mile 203) to the base of Lock and Dam No. 22 near Saverton, Missouri (mile 301) on the Mississippi River and the Illinois River portion of Pool 26 from Grafton, Illinois (mile 0) to the base of the lock and dam at LaGrange, Illinois (mile 80). The lateral boundaries of the study area vary, but usually stop at a major levee, road or railroad grade. In some cases, the availability of old air photography limited the lateral boundaries adjacent to the rivers. ←

Fifteen base maps at a scale of 1:24,000 were prepared for the report which will overlay the 15 pre-impoundment and 15 post-impoundment color coded land use maps. Each land use type cell (polygon) was planimetered and acreages calculated in tabular and graphical form by five-mile reach, by pool and for the total study area. Table I and Figures 1 and 2 illustrate the land use and habitat acreage changes before the dams were in place (circa 1930) and the modern conditions (circa 1970) for each pool and the study total of approximately 144,000 acres of land and water area.

TABLE 1
 UPPER MISSISSIPPI AND LOWER ILLINOIS RIVERS
 POOLS 24, 25, AND 26
 Changes Resulting from the Nine-Foot Channel Project
 Pre-Impoundment (1927-1936) and Post-Impoundment (1975-1977)
 Aquatic and Terrestrial Habitat Acreage

HABITAT	24			25			26 (Mississippi River)			26 (Illinois River)			Pre	Post	Diff.	Percent Change
	Pre	Post	Diff.	Pre	Post	Diff.	Pre	Post	Diff.	Pre	Post	Diff.				
Aquatic																
Main Channel	1002	980	- 22	1164	1147	- 17	1522	1500	- 22	2341	2331	- 10	6029	5958	- 71	- 1.2%
Main Channel Border	4792	6168	+1376	7171	7869	+ 698	8360	10296	+1936	5111	4783	- 328	25434	29116	+3682	+ 14.5%
Side Channel	2841	2731	- 110	4265	4398	+ 133	3697	3818	+ 121	809	605	- 204	11612	11552	- 60	- 0.5%
Sloughs	198	338	+ 140	1381	1421	+ 40	424	664	+ 240	842	1904	+ 1062	2845	4327	+1482	+ 52%
River, Lakes & Ponds	222	279	+ 57	265	781	+ 516	206	616	+ 410	1849	4408	+ 2559	2542	6084	+3542	+139.3%
Tailwaters	0	133	+ 133	0	133	+ 133	0	165	+ 165	0	28	+ 28	0	459	+ 459	
Marsh	135	551	+ 416	950	658	- 292	916	974	+ 58	2608	2290	- 318	4609	4473	- 136	- 2.95%
River	38	23	- 15	54	18	- 36	69	62	- 7	65	39	- 26	226	142	- 84	- 37.2%
TOTAL	(9228)	(11203)	(+1975)	(15250)	(16425)	(+1175)	(15194)	(18095)	(+2901)	(13625)	(16388)	(+ 2763)	(53297)	(62111)	(+8814)	
Terrestrial																
Forest	5903	6834	+ 931	12466	11830	- 636	12335	12985	+ 650	13199	11574	- 1625	43903	43223	- 780	- 1.5%
Brush	32	82	+ 50	597	81	- 516	425	20	- 405	2015	210	- 1805	3069	393	-2676	- 87.2%
Meadow	0	0	0	0	0	0	44	0	- 44	61	4	- 57	105	4	- 101	- 96.2%
Sand	1782	151	-1631	544	789	+ 245	1621	102	-1519	298	1	- 297	4245	1043	-3202	- 75.4%
Agriculture	3674	1699	-1975	9076	8435	- 641	8471	6497	-1974	12074	11319	- 755	33295	27950	-5345	- 16.0%
Developed	446	675	+ 229	373	971	+ 598	667	1847	+1180	953	1327	+ 374	2439	4820	+2381	+ 97.6%
Mud Flats	0	24	+ 24	12	264	+ 252	148	171	+ 23	2	24	+ 22	162	483	+ 321	+ 50.5%
Forested Wetlands	10	301	+ 291	400	610	+ 210	273	128	- 145	2404	4137	+ 1733	3087	5176	+2089	+ 67.7%
TOTAL	(11847)	(9766)	(-2081)	(23468)	(22980)	(- 488)	(23984)	(21750)	(-2234)	(31006)	(28596)	(- 2410)	(90305)	(83092)	(-7213)	

(Total aquatic and terrestrial acreage measurement, Pre = 143602, Post = 145203; Measurement difference, 1601 or 1.1%)

TERRESTRIAL HABITAT

Upper Mississippi and Lower Illinois Rivers, Pools 24, 25, 26

Pre and Post Impoundment

(1927-1936) & (1975-1977)

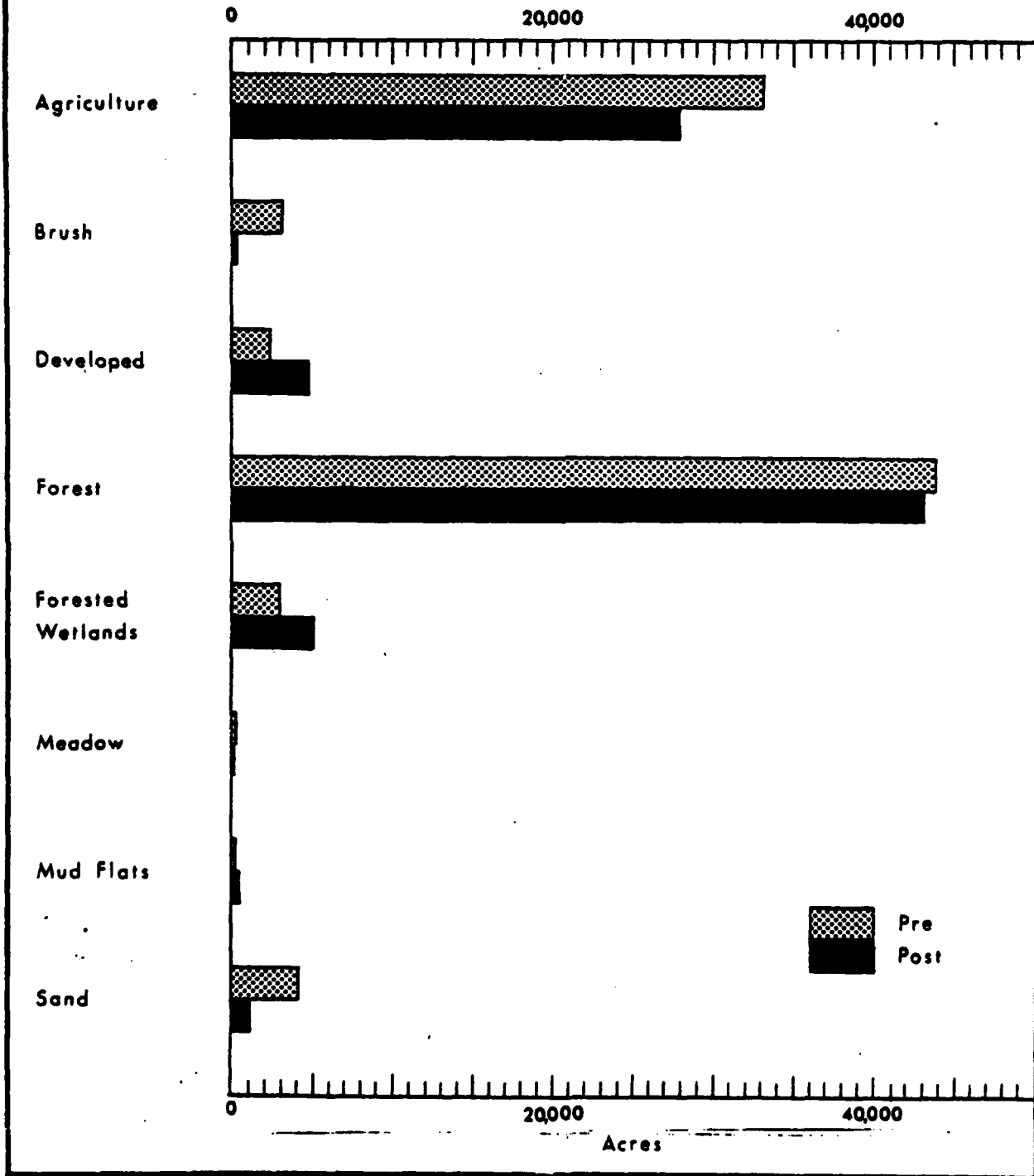


Figure 1

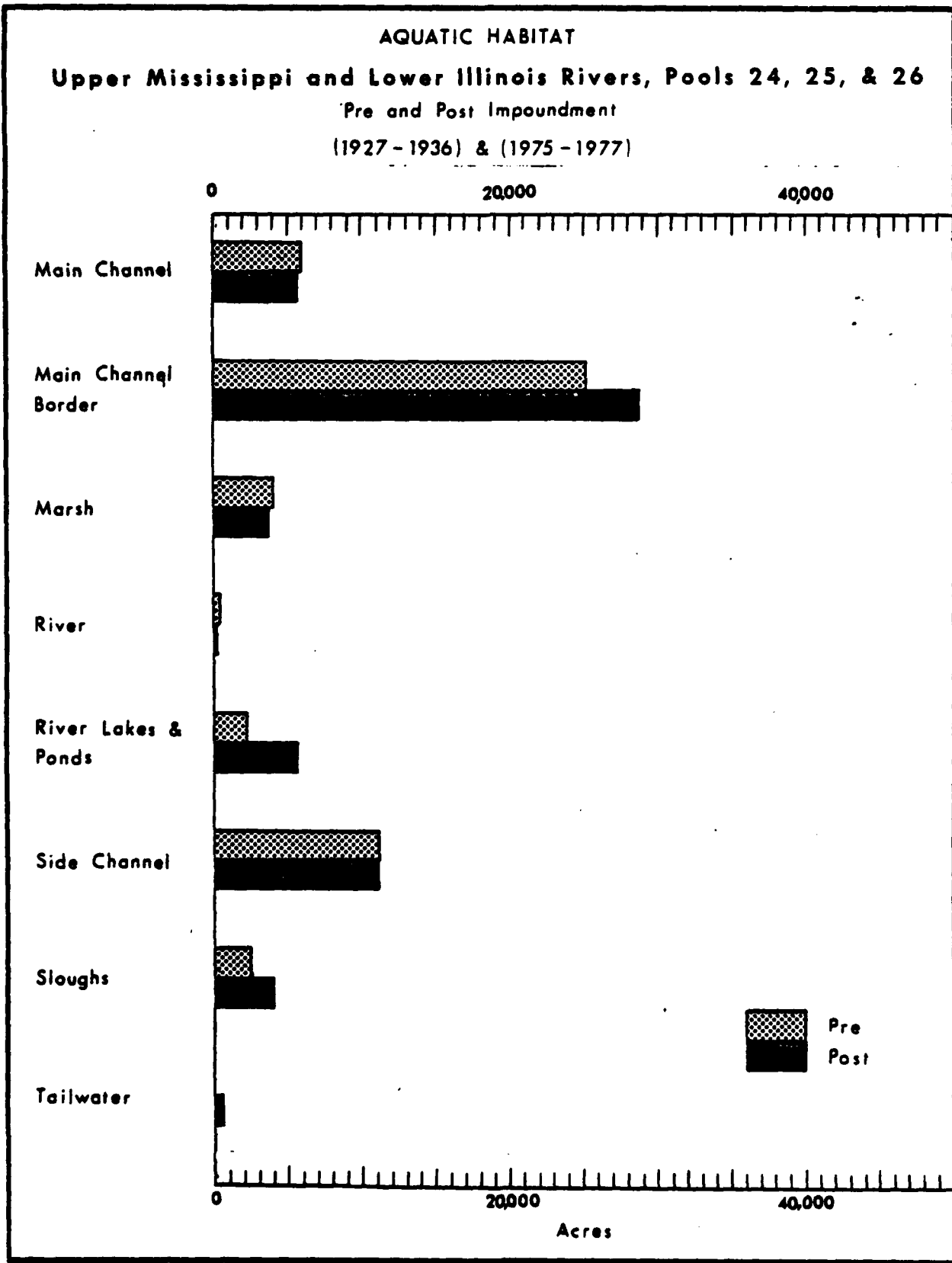


Figure 2

PREFACE

This report is one of a series of accounts which have documented the qualitative and quantitative environmental conditions along the Upper Mississippi and Lower Illinois Rivers in the St. Louis District, as a result of the nine-foot channel project.

Two environmental statements have been filed with the Council on Environmental Quality (CEQ) which describe the environmental setting of the study area: 1) The "Final Environmental Statement - Operation and Maintenance, Pools 24, 25, and 26, Mississippi and Illinois Rivers" was filed with CEQ 12 March 1976. This statement documents the present day environmental setting, the environmental impacts of the action on the environment and alternatives to the present day operation and maintenance procedures; 2) the "Final Environmental Statement - Locks and Dam No. 26 (Replacement) Upper Mississippi Basin, Mississippi River - Alton, Illinois, Missouri and Illinois" was filed with CEQ 8 September 1976. This statement describes the present environmental conditions of the Mississippi and Illinois Rivers and the environmental impacts of the replacement of Locks and Dam 26. Both statements were based on numerous contract reports which describe in detail the study area of Pools 24, 25, and 26. The reader should refer to these statements and reports for a qualitative description of the study area.

INTRODUCTION

The purpose of this report and accompanying maps, tables and figures is to present the quantitative (in acres) and spatial (maps) land use and habitat changes that have occurred as a result of the construction, operation and maintenance of the nine-foot channel navigation project in Pools 24, 25 and 26, Upper Mississippi River and Lower Illinois River in the St. Louis District. The study area extends from Locks and Dam No. 26, Alton, Illinois (mile 203) upstream to the base of Lock and Dam No. 22 at Saverton, Missouri (mile 301) on the Mississippi River and from the Illinois River portion of Pool 26 from Grafton, Illinois (mile 0) to the base of the lock and dam at LaGrange, Illinois (mile 80) (FIGURE 3). The total measured study area land and water acreage totals approximately 144,000 acres.

The pre-impoundment overlay maps were compiled from air photographs taken during the time period 1927-1936 and represents the river and adjacent terrestrial border prior to the construction of the locks and dams. Post-impoundment overlay maps were compiled from air photographs of 1975-1977 vintage and represent modern aquatic and terrestrial habitat and land use.

The U. S. Geological Survey, Mid-Continent Mapping Center, Rolla, Missouri was the prime contractor for this report. They were responsible for the base maps and compiling air photograph information for the pre- and post-impoundment overlays. The Department of Earth Sciences, Geography and Planning, Southern Illinois University-Edwardsville, was responsible for planimetry of the land use areas (polygons) and computation of acreage tables and figures.

The project was designed and monitored by Ronald E. Yarbrough, Ph.D. (geologist) and Steven Hensley, M.S. (fishery biologist) of the Environmental Studies Section, Planning Branch, St. Louis District.

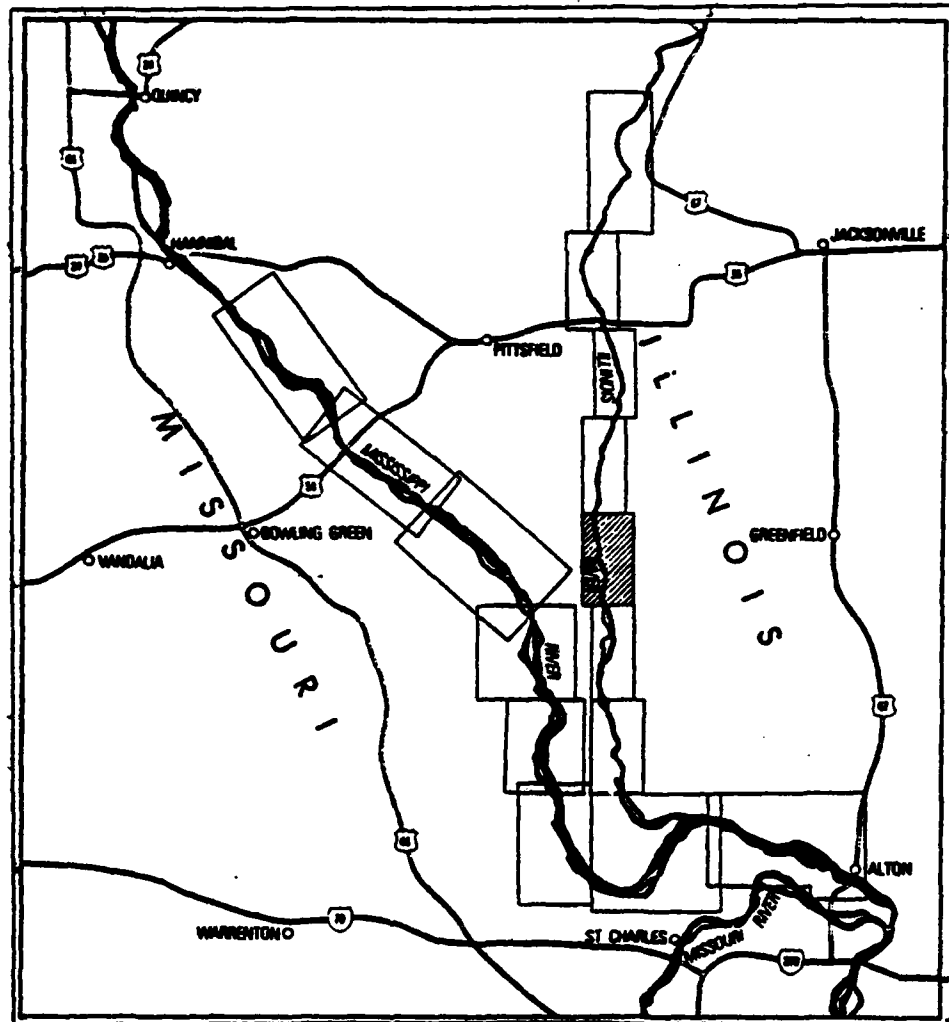
METHODOLOGY

Base Maps

The U. S. Geological Survey at Rolla, Missouri, prepared fifteen black and white base maps of the study area; eight maps along the Mississippi River and seven along the Illinois River (Figure 3). The limits of each map were determined by utilizing a mockup of 34 quadrangles at a scale of 1:24,000 (7-1/2 minute topographic maps). Some of the maps had been published, but others were in the early stages of development which caused a delay of the project.

The bluff line was chosen as the major boundary of the maps, but each map was balanced to achieve the major focus on the rivers. The main channel, as depicted in Corps navigation charts, and river miles were added to the maps. The contour lines were removed and all water areas were screened to promote clarity as an overlay base.

The base maps were collared with the name of the river as a title and the pool and river miles displayed on the map as a sub-title. A location diagram of the study area was prepared for each map and a slight overlap on the upstream and downstream sides of the maps was designated.



Habitat Study Base Maps-
 Shading Represents The Location Of A
 Respective Map In The Study Area

Figure 3

HABITAT - LAND USE CLASSIFICATION

The following terrestrial and aquatic habitat and land use categories were established Corps wide for the Upper Mississippi and Illinois Rivers habitat studies. The St. Paul, Rock Island and Chicago Districts study that was issued by the North Central Division in July 1978 quantified acreage data with a similar classification.

Terrestrial Habitats (i.e., Vegetation and Land Use Types).

(1) Forest (Bottom Land). Areas containing at least 50 percent trees (crown closure) over 15 feet tall. Open areas larger than 1.0 acres within a general forest boundary were delineated. Species composition is primarily cottonwood, black willow, American elm, silver maple, box elder, green ash and river birch, with some basswood, hickory and oak on the better drained sites. This habitat type includes plantations on abandoned agricultural land.

(2) Brush. Areas dominated by woody, shrub vegetation that rarely exceeds 15 feet in height. Species composition is nearly the same as bottom land forest with a larger percent of willow.

(3) Meadow. Areas without standing water most of the growing season. Grasses, sedges, rushes and broad-leaved plants predominate; brush cover is less than 50 percent. Some abandoned agricultural land is incorporated in this class. Includes some Type 2 wetlands as classified by United States Fish and Wildlife Service. This type of wetland (wet meadow) is rare in the St. Louis District portion of the rivers.

(4) Sand. Areas of bare sand or sand sparsely covered with vegetation. This would include dredge material in the post-impoundment overlays.

(5) Mud Flats. Areas of bare mud or, depending upon time of year, vegetated mud flats exposed by seasonal water level fluctuation.

(6) Agricultural. Open areas devoted to annual crops, pasture, or landscape nurseries. Marsh lands are included in this category if they exhibit characteristics of agricultural use.

(7) Developed. Open areas which are either: 1) dominated by industrial or commercial types of buildings or activities; or 2) showing signs of earth moving activities (includes roads, highways and railroads and their consequent cuts and fills, coal terminals, gravel pits, marinas, and industrial buildings); or 3) areas occupied by residences and related features such as lawns and woodlots along with residential streets.

channel border, and infrequently at other locations. In the impounded section of the river, these are mostly submerged. The bottom type usually varies from sand in the upper reaches, to silt in the lower. In the swifter current, there is no rooted aquatic vegetation, but vegetation is common in the shallower areas having silty bottoms and moderate to slight current.

Other terms that have been used for this habitat are sloughs, running sloughs, chutes, cuts, guts, cut off and canals.

(4) Sloughs. This category includes all of the remaining aquatic habitat found in the river. They may be relatively narrow branches or off shoots of other bodies of water. They are characterized by having no current at normal water stage, soft bottoms, and an abundance of submerged and emergent aquatic vegetation. These sloughs and some of the ponds and smaller lakes are most often representative of the ecological succession taking place in the river bottoms, from aquatic to marsh habitat.

(5) River Lakes and Ponds. In connection with this classification, broadly speaking, the term "backwater" is no longer used. This is not incorporated in the lake and pond category, or in the classification termed "sloughs." Normally, only those lakes having some connection with a river during normal water stages are considered in this classification. However, some artificially developed farm ponds have been included. River lakes and ponds may or may not have a slight current, depending on their location. Most of the bottoms are mud or silt, often consisting of a layer two or more feet thick. These waters may have an abundance of rooted aquatic vegetation, both submerged and emergent. They may be surrounded by marshland.

(6) Tail Waters. These include the main channel, main channel border, and other areas immediately below the dams which are affected in turbulence by the passage of water through the gates of the dams and out of the locks. Since these areas change in size according to water stage, an arbitrary lower boundary for fishery purposes has been set at a distance of one-half mile below the dams. The bottom is mostly sand, rock, or rubble. No rooted aquatic vegetation is present.

(7) Marsh. Low-lying flat, wet land, covered partially or entirely with water and subject to annual flooding. Dominant vegetation is grass-like plants (gramminoids) composed mainly of rushes, sedges and cattails. Single species often form nearly pure stands. Forbs and brush are uncommon. For the purpose of this

TABLE II
 U.S. GEOLOGICAL SURVEY
 LAND USE AND LAND COVER CLASSIFICATION SYSTEM FOR
 USE WITH REMOTE SENSOR DATA

<u>LEVEL I</u>	<u>LEVEL II</u>
1 Urban or Built-up Land	11 Residential
	12 Commercial and Services
	13 Industrial
	14 Transportation, Communications and Utilities
	15 Industrial and Commercial Complexes
	16 Mixed
	17 Other
2 Agricultural Land	21 Cropland and Pasture
	22 Orchards, Groves, Vineyards, Nurseries, and Ornamental Horticultural Areas
	23 Confined Feeding Operations
	24 Other
3 Rangeland	31 Herbaceous Range
	32 Shrub-Brushland Range
	33 Mixed
4 Forest Land	41 Deciduous
	42 Evergreen
	43 Mixed
5 Water	51 Streams and Canals
	52 Lakes
	53 Reservoirs
	54 Bays and Estuaries
6 Wetland	61 Forested
	62 Nonforested
7 Barren Land	71 Dry Salt Flats
	72 Beaches
	73 Sandy Areas Other than Beaches
	74 Bare Exposed Rock
	75 Strip Mines, Quarries, and Gravel Pits
	76 Transitional Areas
	77 Mixed

LEVEL I

- 8 Tundra

- 9 Perennial Snow or Ice

LEVEL II

- 81 Shrub and Brush Tundra
- 82 Herbaceous Tundra
- 83 Bare Ground Tundra
- 84 Mixed

- 91 Perennial Snowfields
- 92 Glaciers

TABLE III

LEVEL III LAND USE AND HABITAT CLASSIFICATION SYSTEM

10	Developed
21	Agriculture
32	Brush
411	Deciduous Forest (50 percent Crown Cover)
51	River
511	Main Channel (Pre-impoundment)
512	Main Channel Border (Pre-impoundment)
513	Side Channel (Pre-impoundment)
521	Slough
522	River Lake or Pond
531	Main Channel (Post-impoundment)
532	Main Channel Border (Post-impoundment)
533	Side Channel (Post-impoundment)
534	Tail Water
61	Forested Wetland
621	Meadow
622	Marsh
623	Mud Flat
72	Sand

PHOTOGRAMMETRY

The St. Louis District supplied the Branch of Photogrammetry, Mid-West Mapping Center, U.S.G.S., with pre-impoundment black and white aerial photographs flown in 1927, 1931, 1935 and 1936. The 1927 photography consists of 9- x 30-inch mosaic strips centered over the main channel only. The 1931 photography consists of 7- x 9-inch paper prints from a set covering from Des Plaines, Illinois to Cairo, Illinois (Illinois River and Pool 26, Mississippi River). The 1935 and 1936 photography is also 9-inch paper prints of the Mississippi River in the study area. The scale of all of the photography is approximately 1:12,000.

U.S.G.S. personnel considered the photography fairly good considering its age and the technical advancement of photographic equipment at the time. Only about 20 percent of the project area was covered with stereoimagery and the remaining major portion was covered with monoscopic imagery. Additional sources supplied U.S.G.S. consisted of maps and odd photography of selected sections of the study area. The post-impoundment photography is 9- x 9-inch paper prints; 1:36,000 conventional color (1978), 1:14,000 color infrared (1974) and 1:12,000 black and white photography (1976).

The old photography was flown when the rivers were at "normal" stage (not high stage or abnormally low). For example, the 8 December 1935 photography near Lock and Dam 25 (Cap au Gris, Missouri) was taken when the river stood at 419 feet msl. The post-impoundment photography was also taken at "normal pool."

The compilation procedures consisted of the photogrammeter taping a piece of astro film over the photo, outlining and identifying the land use areas and transferring the polygons to a scribe base. The scribe base was then enlarged and reduced respectively to fit the 1:24,000 base map scale.

Several problems arose during the project, the most serious of which was the lack of pre-impoundment photographs for mile 51 to mile 61 on the Illinois River. This area of about 2400 acres was mapped utilizing the post-impoundment imagery only and the acreage figures removed from the acreage totals so comparison "noise" would be minimal. Other problems were generally aquatic habitat interpretations and these were solved with the assistance of the St. Louis District biological personnel.

DATA COMPUTATION AND PRESENTATION

The base maps and the 15 pre- and post-impoundment overlays from U.S.G.S. were delivered to Noble R. Thompson, PhD, Department of Earth Sciences, Geography and Planning to be measured and data displayed. The four principal parts of the study completed by the contractor are as follows: 1) the determination of the acreage for each of the sixteen designated habitat types for the pre- and post-impoundment overlays by utilization of optical planimeter; 2) the design and computation of quantitative data displayed in tabular form for the study area, by pool and by five mile interval; 3) the design and construction of graphs to visually portray the data summarized in the tables; and 4) the development of a color code and hand coloring of two sets of the 30 overlay maps.

The determination of acreage of the habitat areas delineated by U.S.G.S. was by the use of an optical planimeter. In the case of each respective reach of the Mississippi and Illinois Rivers, the area contained within the outer perimeter was synonymous for pre- and post-impoundment. Only the size, shape, and number of various habitats within each reach changed between pre- and post-impoundment. Therefore, the total acreage for corresponding areas of pre- and post-impoundment is equal. However, an error or difference of measurement was recorded and is indicated at the bottom of each table. This error is attributable, in part, to three factors - rounding each measurement off to the nearest tenth of an acre, the necessity of remeasuring boundary lines separating contiguous habitat areas, and the use of an average measurement of four feet and thirty-six feet for the width of dikes and roads respectively. The percent of error was determined by obtaining the difference between the pre- and post-measurements, dividing this difference by their mean, and multiplying by one hundred. The quality control of measurement was targeted at less than two percent which was maintained for each pool and the total study area.

The tables were calculated to summarize the data obtained from the habitat areas measured. Aquatic and terrestrial habitat acreages by five river mile intervals are recorded separately for Pool 24, 25, 26 (Mississippi River), and 26 (Illinois River). Also a table summarizing the total study area by pools is included. In each of these tables the absolute change in habitat acreage between pre- and post-impoundment is indicated and totaled.

In order to present a better visual contrast of the habitat changes reflected in the tables, comparative bar graphs were constructed. This type of graph was selected because it conveys the

information clearly and is easily understood, the length of the bar being proportional to the number of acres it represents. Shading was used to enhance the contrast between pre- and post-impoundment habitat acreages. The bars indicating pre-impoundment acreages are shaded with a 27-1/2 line, 30 percent dot screen while the bars for post-impoundment acreages are shaded black.

The 15 pre- and 15 post-impoundment overlay maps were divided into a 5-mile reach by drafting lines perpendicular to the main channel and numbering or lettering each to correspond with the sections indicated on the tables and graphs. The 5-mile sections allow the reviewer to "break out" areas of the pools which are different (i.e., immediately upstream of the dams).

Two sets of the overlays were hand colored utilizing the international color code system (Table IV). This allows one to overlay its base map and to see the location of the habitat types. Also, one may overlay an uncolored habitat and land use map over a colored map and compare the land use changes through time.

Problems that arose (for example, unnumbered polygons) were agreed upon by close coordination between the contractors and St. Louis District personnel. Spot field checking by Corps and SIU-E personnel revealed a high level of accuracy by the U.S.G.S. photogrammetry team. But, ground truthing during high river stage revealed that land use and habitat types change (i.e., Mud Flat to Main Channel Border or Forest to Forested Wetland). Also, the long time period of 40 years between the overlay maps (circa 1930 to circa 1970) was also a concern.

Thus, a control reach (mile 233 to 241.5 - Sections 7 and 8) of 9 miles was investigated for the year 1950. The river stages respectively at Cap au Gris, Missouri (Lock and Dam 25) were; 1935 photography - 419 feet msl, June 26 and July 7, 1950 - 432 feet msl and 422 feet msl and October 13, 1977 - 424 feet msl. The investigator (C. J. Stark, 1978) worked under supervision of Dr. Thompson, SIU-E and Mr. Jerry Combs, U.S.G.S. The results of her study are summarized in Figures 4 and 5. As expected, "forested wetland" increased in 1950 in relation to forest as a result of the high river stage as did "main channel border" and "slough."

TABLE IV
 COLOR CODE FOR THE OVERLAY MAPS

Prismacolor Pencil Number	Habitat Number	Classification	
(Aquatic)	933	511 or 531	Main Channel
	906	512 or 532	Main Channel Border
	904	513 or 533	Side Channel
	905	521	Sloughs
	919	522	River, Lakes & Ponds
	920	534	Tail Water
	913	622	Marsh
	902	51	River
(Terrestrial)	908	411	Forest
	911	32	Brush
	910	621	Meadow
	940	72	Sand
	947	21	Agriculture
	925	10	Developed
	939	623	Mud Flats
	8098*	61	Forested Wetlands

*A Colorama pencil was used for this classification.

FIGURE 4: MISSISSIPPI RIVER AQUATIC HABITATS 1935, 1950, 1977

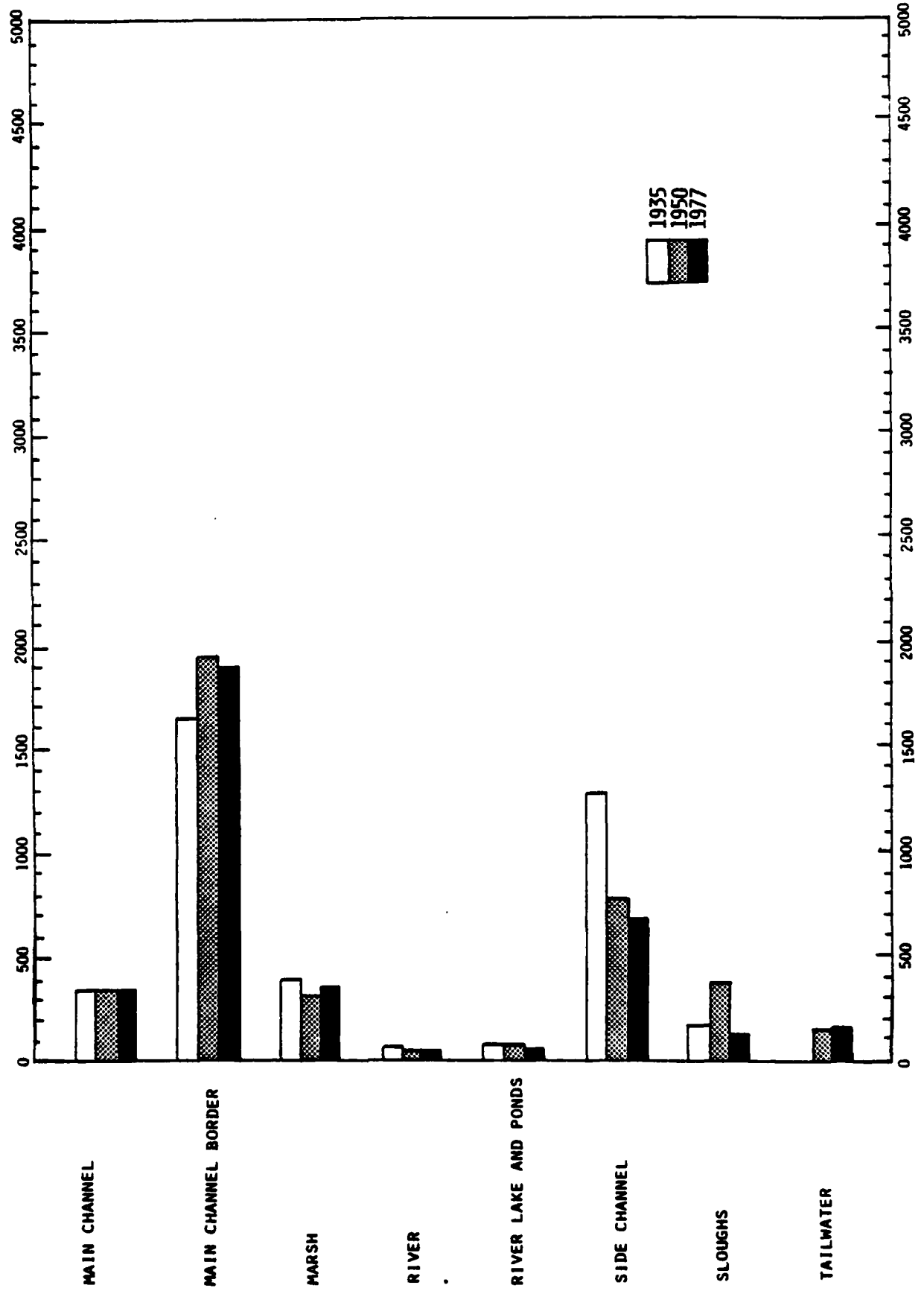
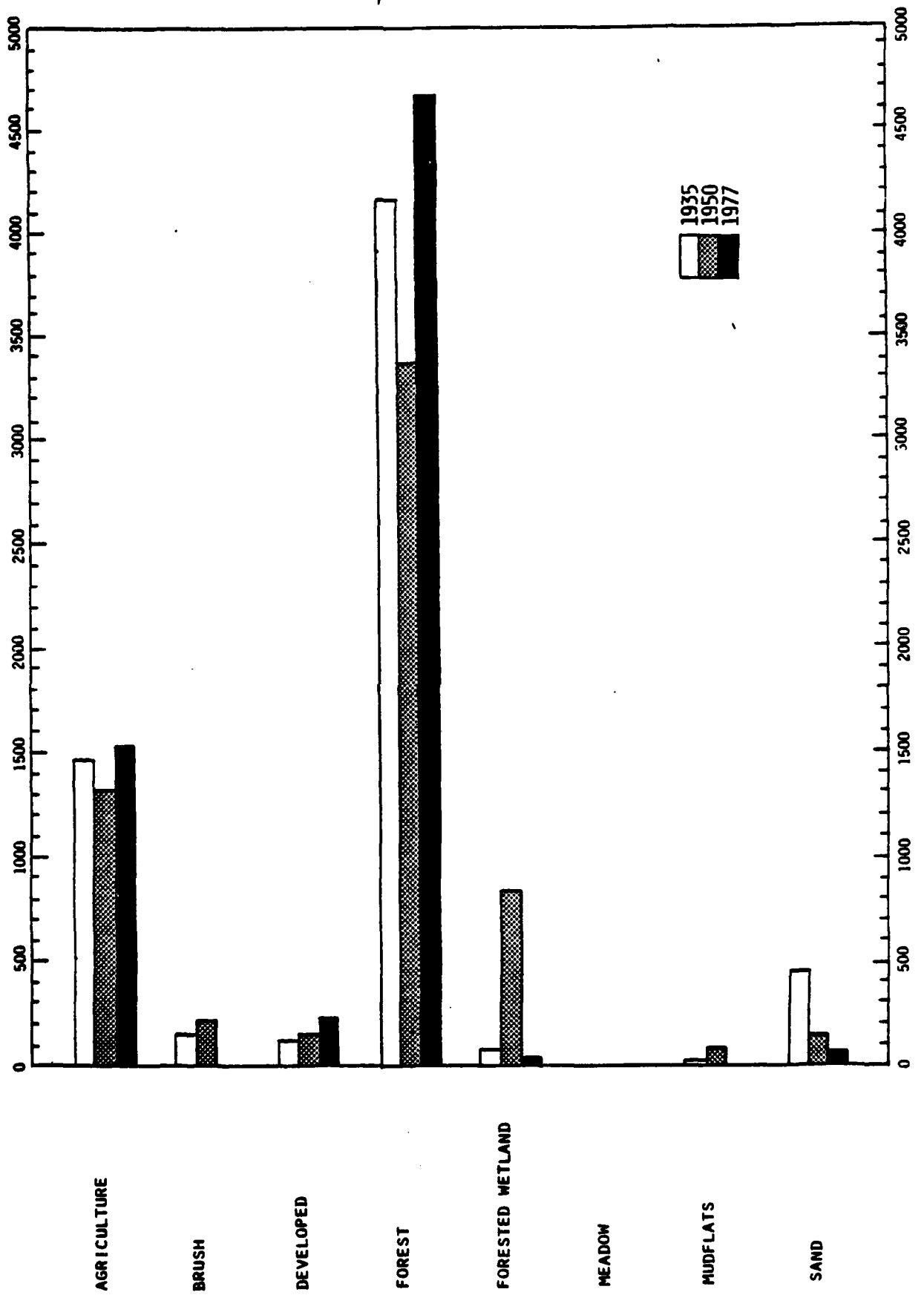


FIGURE 6: MISSISSIPPI RIVER TERRESTRIAL HABITATS 1935, 1950, 1977



CONCLUSIONS

The total land-water study area consists of approximately 144,000 acres. If the data is smoothed (the 1.17 degree measurement error is incorporated into the final data) the project area has "gained" approximately 8,000 acres of aquatic habitat at "normal" river level and has "lost" a corresponding 8,000 acres of terrestrial area. The acreage change is approximately 5.6 percent of the total project area.

Study of the maps and the graphs and charts show thousands of small changes in land use and aquatic habitat. The largest changes in the study area occurred in the lower Illinois River at Calhoun Point (Section 5 - river mile 5 to 10) where large areas of forest were drowned and Swan Lake was created.

APPENDIX

A

TABLES OF
HABITAT TYPES
BY RIVER AND
FIVE MILE
REACH

Reproduced from
best available copy.

UPPER MISSISSIPPI AND LOWER ILLINOIS RIVERS
POOLS 24, 25, AND 26
Changes Resulting from the Nine-Foot Channel Project
Pre-Impoundment (1927-1936) and Post-Impoundment (1975-1977)
Aquatic and Terrestrial Habitat Acreage

HABITAT	POOLS														
	24			25			26 (Mississippi River)			26 (Illinois River)					
	Pre	Post	Diff.	Pre	Post	Diff.	Pre	Post	Diff.	Pre	Post	Diff.			
Aquatic	1002	980	-22	1164	1147	-17	1522	1500	-22	2341	2331	-10	6029	5958	-71
Main Channel	4792	6168	+1376	7171	7869	+698	8360	10296	+1936	5111	4783	-328	25434	29116	+3682
Side Channel	2841	2731	-110	4265	4398	+133	3697	3818	+121	809	605	-204	11612	11552	-60
Sloeghs	198	338	+140	1381	1421	+40	424	684	+260	842	1904	+1062	2845	4327	+1482
Rivers, Lakes & Ponds	222	279	+57	265	781	+516	206	616	+410	1849	4408	+2559	2542	6084	+3542
Tallwaters	0	133	+133	0	133	+133	0	165	+165	0	28	+28	0	-59	+459
Marsh	135	551	+416	950	658	-292	916	974	+58	2608	2290	-318	4609	4473	-136
River	38	23	-15	54	18	-36	69	62	-7	65	39	-26	226	142	-84
TOTAL	(9228)	(11203)	(+1975)	(15250)	(16425)	(+1175)	(15194)	(18095)	(+2901)	(13625)	(16388)	(+2763)	(53297)	(62111)	(+8814)
Terrestrial	5903	6834	+931	12466	11830	-636	12335	12985	+650	13199	11574	-1625	43903	43223	-680
Forest	32	82	+50	597	81	-516	425	20	-405	2015	210	-1805	3069	393	-2676
Brush	0	0	0	0	0	0	44	0	-44	61	4	-57	105	4	-101
Meadow	1782	151	-1631	544	789	+245	1621	102	-1519	298	1	-297	4245	1043	-3202
Sand	3674	1699	-1975	9076	8435	-641	8471	6497	-1974	12074	11319	-755	33295	27950	-5345
Agriculture	446	675	+229	373	971	+598	667	1847	+1180	953	1327	+374	2439	4820	+2381
Developed	0	24	+24	12	264	+252	148	171	+23	2	24	+22	162	83	+321
Wetlands	10	301	+291	400	610	+210	273	128	-145	2404	4137	+1733	3087	5176	+2089
TOTAL	(11847)	(9766)	(-2081)	(23468)	(22980)	(-488)	(23984)	(21750)	(-2234)	(31006)	(28596)	(-2410)	(90305)	(83927)	(-7213)

(Total aquatic and terrestrial acreage measurement, Pre = 143602, Post = 145203; Measurement difference, 1601 or 1.1%)

Reproduced from
best available copy.

UPPER MISSISSIPPI RIVER, MICH. 26
Changes Resulting from the Blue-Foot Channel Project
Pre-impoundment (1927-1936) and Post-impoundment (1935-1977)
Aquatic Habitat Acctage

Section	Reach River Miles	Main Channel		Main Channel Border		Side Channel		Sloughs		Rivers, Lakes & Ponds		Tollwaters		Marsh		Silver		Total Aquatic										
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post											
1	202.6 (Lock & Dam 26)- 208	176	173	-3	1593	2199	+606	163	136	-7	31	34	+3	0	133	+133	0	36	+36	25	130	+105	0	0	1968	2839	+871	
2	208 - 213	161	161	0	1285	1722	+437	643	711	+68	23	3	-20	0	241	+241	0	0	0	20	25	+5	1	5	+4	2133	2868	+735
3	213 - 218	187	187	0	1140	1246	+106	311	405	+94	68	149	+81	0	127	+127	0	0	0	36	102	+66	0	0	0	1762	2216	+454
4	218 - 223 Left Bank, Illinois Calloway Prairie	0	0	0	209	257	+48	0	0	0	1	33	+32	0	1	+1	0	0	0	12	88	+76	0	0	0	222	319	+97
	Right Bank, Mississippi	335	335	0	529	687	+158	139	235	+96	19	216	+195	10	1	-9	0	0	0	150	207	+57	0	0	0	1182	1679	+497
5	223 - 228	0	0	0	515	608	+173	296	316	+18	55	31	-24	24	65	+41	0	0	0	134	35	-99	0	0	0	1024	1133	+109
6	228 - 233	100	100	0	763	948	+205	1065	812	-253	35	43	+8	13	23	+10	0	0	0	60	68	-11	1	2	+1	2133	2093	-40
7	233 - 238	174	174	0	781	946	+165	409	522	+113	30	53	+23	90	10	-80	0	0	0	75	70	-5	0	0	0	1559	1725	+166
8	238 - 243.5 (Lock & Dam 25)	181	181	0	886	956	+70	533	633	+100	73	51	-22	65	0	-65	0	0	0	168	175	-43	49	41	-8	1955	1907	-48
TOTALS	202.6 - 243.5	1522	1508	-22	8360	10296	+1936	3697	3818	+121	424	664	+240	206	616	+410	0	165	+165	916	976	+59	69	62	-7	15196	16095	899

(Total aquatic and terrestrial acreage measurements, Pre-1918, Post-1984; Measurement difference 667 acres or 1.7%)

UPPER MISSISSIPPI RIVER, POOL 26
 Changes Resulting from the High-Foot Channel Project
 Pre-Improvement (1927-1946) and Post-Improvement (1975-1977)
 Terrestrial Habitat Acreage

Section	Reach River Miles	Forest		Brush		Meadow		Sand		Agriculture		Developed		Mud Flats		Forested Wetlands		Total Terrestrial									
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Diff.							
1	202.6 (Lock & Dam 26)	521	511	-110	29	0	-29	0	0	123	12	-111	860	84	-776	95	201	+106	6	139	+133	39	0	-39	1773	947	-826
2	200 - 213	804	681	-203	28	2	-26	0	0	230	17	-213	1046	376	-670	93	380	+286	0	32	+32	0	0	0	2281	1497	-784
3	213 - 219	1495	1010	-306	21	0	-21	0	0	131	0	-131	550	1047	+497	44	74	+30	21	0	-21	26	6	-20	2198	2146	-52
4	210 - 223 Left Bank, Illinois Cahoon Point Right Bank, Mississippi	104	112	+8	5	2	-3	0	0	0	0	0	265	137	-128	79	116	+37	69	0	-69	17	0	-17	539	367	-172
		1058	1756	+698	27	0	-27	20	0	169	18	-151	916	995	+89	28	116	+88	6	0	-6	35	0	-35	1058	2485	-1427
		861	977	+116	130	0	-130	0	0	123	5	-118	1617	1501	-116	63	172	+109	1	0	-1	27	57	+30	2822	2708	+114
5	221 - 228	1605	2133	+528	28	13	-15	0	0	187	7	-180	1123	706	-419	112	367	+255	21	0	-21	30	16	-14	3116	3740	+624
6	228 - 231	1020	1179	+159	25	2	-23	16	0	216	3	-235	649	516	-133	60	217	+157	7	0	-7	29	29	0	2086	1966	-120
7	231 - 240	2304	2996	+692	96	0	-96	0	0	283	37	-246	551	506	-45	47	48	+1	17	0	-17	31	4	-27	3609	3591	-18
8	240 - 251.5 (Lock & Dam 25)	1392	1621	+229	36	1	-35	0	0	137	7	-130	856	1011	+155	46	147	+101	0	0	0	0	0	0	2306	2813	+507
TOTALS	202.6 - 251.5	13335	17005	+3670	425	20	-605	44	0	1621	102	-1519	8671	6497	-2174	667	1047	+380	148	171	+23	273	128	-145	23906	21790	+2116

(Total aquatic and terrestrial acreage assessment, Pre-1978, Post-1984); Measurement differences 647 acres or 1.7%

Reproduced from
 best available copy.

UPPER MISSISSIPPI RIVER, POOL 25
 Change Resulting from the River-Pool Channel Project
 Pre-Improvement (1923-1936) and Post-Improvement (1935-1977)
 Aquatic Habitat Acres

Section	Beach River Miles	Main Channel		Side Channel		Sloughs		Rivers, Lakes & Ponds		Tollwaters		Marsh		River		Total Aquatic												
		Pre	Post	Diff.	Pre	Post	Diff.	Pre	Post	Diff.	Pre	Post	Diff.	Pre	Post	Diff.	Pre	Post	Diff.									
9	241.5 (Lock & Dam 23)- 247	200	200	0	1261	2069	+808	650	929	+279	282	247	-15	0	385	+377	0	0	184	100	-84	37	0	-37	2622	1930	+1308	
10	247 - 252	180	180	0	1327	1628	+301	481	372	-29	195	231	+56	14	271	+257	0	0	40	76	+36	0	0	0	2157	2786	+631	
11	252 - 257	183	183	0	1228	1165	-63	854	999	+145	250	440	+190	19	32	+13	0	0	48	78	+30	0	0	0	2582	2897	+315	
12	257 - 262	188	188	0	1048	918	-130	523	506	-17	162	128	-34	29	33	+4	0	0	70	37	-33	5	9	+6	2017	1803	-214	
17	262 - 267	183	183	0	951	988	+37	846	857	+11	202	171	-31	65	29	-36	0	0	46	145	+99	12	9	-3	2307	2492	+185	
14	267 - 271.4 (Lock & Dam 24)	238	231	-7	1356	1179	-177	989	735	-254	290	184	-106	138	31	-98	0	133	613	562	222	0	0	0	0	1565	2113	+548
TOTALS	241.5 - 271.4	1164	1167	+3	7171	7869	698	4265	4798	+533	1381	1671	+290	265	781	+516	0	133	613	950	658	-292	34	18	-16	13230	16125	+2895

(Total aquatic and terrestrial acreage measurement, Pre-1936, Post-1940; Measurement difference -487 acres or 1.03)

UPPER MISSISSIPPI RIVER, PLOU 25
 Changes Resulting from the Blue-Pond Channel Project
 Pre-impoundment (1927-1936) and Post-impoundment (1937-1977)
 Terrestrial Habitat Acreage

Section	Brush Silver Willow	Forest		Brush		Hemlock		Sawd		Agriculture		Developed		Wet Flats		Forested Wetlands		Total Terrestrial									
		Pre	Post	Diff.	Pre	Post	Diff.	Pre	Post	Diff.	Pre	Post	Diff.	Pre	Post	Diff.	Pre	Post	Diff.	Pre	Post	Diff.					
9	241.3 (Lock & Dam 25)- 247	2240	8000	-440	60	2	-87	0	0	72	608	+536	1869	295	-1374	40	199	+159	0	132	+132	129	1	-128	4219	3037	-1182
10	247 - 252	1323	1337	+14	121	2	-99	0	0	29	144	+115	1906	1177	-729	62	134	72	0	130	+128	47	9	-38	3468	2935	-533
11	251 - 257	2433	2460	+27	104	62	-42	0	0	3	14	+11	1750	1330	-420	30	139	+109	0	0	0	27	131	+104	4363	4166	-219
12	257 - 262	1346	1537	+211	106	13	-93	0	0	9	3	-6	807	636	-166	40	201	+161	10	2	-8	53	232	+219	2306	2689	+418
13	262 - 267	2310	2325	+205	87	0	-87	0	0	116	12	-104	617	1287	+650	35	68	+33	2	2	0	184	54	-36	3491	3548	+57
14	267 - 273.4 (Lock & Dam 26)	2616	2551	-63	130	2	-128	0	0	315	8	-307	2704	3702	+1398	150	224	+68	0	0	0	40	163	+103	5541	6632	+1102
TOTALS	241.5 - 273.4	12446	11020	-836	597	81	-516	0	0	544	789	+245	9076	8435	-641	373	971	+598	12	264	+252	600	610	+210	24408	22980	-1488

(Total aquatic and terrestrial acreage measurement, Pre-38110, Post-39475; Measurement difference = 67 acres or 1.82)

UPPER MISSISSIPPI RIVER, POND 24
 Changes Resulting from the Nine-Foot Channel Project
 Pre-impoundment (1927-1936) and Post-impoundment (1937-1977)
 Aquatic Habitat Acreage

Section	Pre-h River Miles	Main Channel		Main Channel Border		Side Channel		Sloughs		Stems, Lakes & Ponds		Tailwaters		Marsh		River		Total Aquatic									
		Pre	Post	Diff.	Pre	Post	Diff.	Pre	Post	Diff.	Pre	Post	Diff.	Pre	Post	Diff.	Pre	Post	Diff.	Pre	Post	Diff.					
15	273.4 (Leach & Dun 2-1- 279)	202	202	0	949	1731	+782	792	+0	25	217	+192	46	117	+71	0	0	18	151	+133	0	0	0	2024	3210	+1186	
16	279 - 285	182	182	0	990	1341	+351	308	+25	15	28	+13	23	71	+48	0	0	10	43	+33	0	3	+2	1513	1976	+463	
17	284 - 289	178	178	0	706	887	+181	442	+55	60	67	-1	84	6	-78	0	0	13	94	+81	38	14	-24	1529	1765	+236	
18	289 - 294	182	182	0	882	1067	+185	514	+52	59	23	-36	33	48	+15	0	0	56	156	+100	0	0	0	1826	2042	+216	
19	294 - 299	176	176	0	763	808	+45	544	-56	24	0	-24	29	8	-21	0	0	26	65	+39	0	6	+6	1562	1551	-11	
20	299 - 301.4 (Leach & Bun 22)	82	60	-22	394	314	-80	274	88	-194	7	3	-4	5	27	+22	0	133	+133	12	42	+30	0	0	774	679	-95
TOTALS	273.4 - 301.4	1002	908	-22	4792	6168	+1376	2841	-110	198	318	+140	222	279	+57	0	133	+133	135	531	+416	38	23	-15	9228	11203	+1975

(Total aquatic and terrestrial acreage measurement, Pre=21075, Post=20969; Measurement difference = 106 acres or 0.5%)

Reproduced from
 best available copy.

UPPER MISSISSIPPI RIVER, NO. 24
 Changes Resulting from the River-Foot Channel Project
 Pre-Independent (1917-1936) and Post-Independent (1937-1977)
 Territorial Subplot Acreage

Section	Reach River Miles	Forest		Brush		Meadow		Sand		Agriculture		Developed		Bad Place		Forested Wetlands		Total Territorial										
		Pre	Post	Diff.	Pre	Post	Diff.	Pre	Post	Diff.	Pre	Post	Diff.	Pre	Post	Diff.	Pre	Post	Diff.	Pre	Post	Diff.						
15	271.5 (Lock & Dam 24)- 279	1649	297	-252	0	4	-4	0	0	276	48	-228	781	50	-731	82	190	+108	0	0	4	10	+6	2200	1099	-1101		
16	279 - 285	501	671	+170	2	2	0	0	0	257	13	-244	444	17	-427	98	172	+82	0	0	0	0	0	0	1294	875	-419	
17	285 - 289	1214	2117	+903	7	23	+16	0	0	352	16	-336	847	348	-499	86	67	-19	0	1	0	0	0	0	641	2966	2633	-333
18	289 - 294	1408	1596	+188	3	53	+50	0	0	540	63	-477	1071	1007	-64	56	109	+53	0	7	0	0	0	0	3138	2835	-303	
19	294 - 299	670	1440	+770	12	0	-12	0	0	303	6	-297	528	277	-251	95	105	+10	0	13	+13	6	80	674	1916	1921	+7	
20	299 - 301.5 (Lock & Dam 25)	441	213	-228	0	0	0	0	0	54	5	-49	3	0	-3	37	32	-5	0	3	0	0	0	0	150	435	403	-448
TOTALS	271.5 - 301.5	5403	6834	+1431	32	82	+50	0	0	1782	151	-1631	3674	1699	-1975	446	675	+229	0	24	+24	10	301	+291	11867	9766	-2081	

(Total aquatic and terrestrial acreage measurement, Pre-21075, Post-20969; Measurement difference = 106 acres or 0.3%)

ILLINOIS RIVER, PAUL Z6
 Changes Resulting from the Nine-Foot Channel Project
 Pre-Improvement (1927-1936) and Post-Improvement (1975-1977)
 Aquatic Habitat Arrears

Section	Reach River Miles	Main Channel		Side Channel		Sloughs		Sivers, Lakes & Ponds		Tollumens		Marsh		River		Total Aquatics													
		Pre	Post	Diff.	Pre	Post	Diff.	Pre	Post	Diff.	Pre	Post	Diff.	Pre	Post	Diff.	Pre	Post	Diff.										
A	5 - 10	181	183	0	529	565	+36	26	39	-13	89	200	+112	0	2700	+2800	0	0	0	637	731	+114	0	0	1474	4017	+2543		
B	10 - 15	182	182	0	367	384	+17	72	68	-12	83	404	+321	7	356	+349	0	0	0	588	588	0	2	1	-1	1301	1975	+674	
C	15 - 20	177	177	0	511	492	-19	79	69	-10	6	43	+35	0	7	+7	0	0	0	51	-30	-21	3	2	-1	829	820	-9	
D	20 - 25	176	176	0	374	346	-28	98	85	-13	31	156	+125	0	0	0	0	0	0	67	227	+160	9	13	+4	753	1001	+248	
E	25 - 30	176	176	0	278	307	+29	267	215	-52	3	91	+88	0	0	0	0	0	0	187	369	+182	0	0	0	911	1150	+239	
F	30 - 35	182	182	0	578	576	-182	28	24	-4	31	28	-3	84	120	+36	0	0	0	83	41	-42	0	0	0	986	871	-115	
G	35 - 40	192	192	0	488	456	-33	73	62	-11	24	106	+82	46	0	-46	0	0	0	46	0	-46	7	8	+1	877	812	-65	
H	40 - 45	173	173	0	465	422	-43	21	5	-16	21	19	-2	0	0	0	0	0	0	81	6	-75	0	0	0	761	675	-86	
I	45 - 50	181	181	0	358	311	-27	72	65	-27	13	54	+41	1	0	-1	0	0	0	56	0	-56	0	0	0	681	611	-70	
J	50 - 55	181	181	0	70	377	0	0	0	0	0	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
K	55 - 60	177	177	0	291	0	0	32	0	0	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
L	60 - 65	185	185	0	227	306	+79	0	0	0	59	223	+164	0	24	+16	0	0	0	123	75	-48	0	0	0	600	813	+213	
M	65 - 70	184	184	0	311	235	-76	38	14	-24	201	396	+95	69	0	-69	0	0	0	224	163	-61	41	11	-30	1188	1093	-95	
N	70 - 75	177	177	0	323	244	-79	19	7	-12	78	80	+2	795	756	-39	0	0	0	248	24	-224	1	0	-1	1641	1788	+147	
O	75 - 80	177	167	-10	271	219	-52	12	0	-12	101	103	+2	839	845	+6	0	0	28	238	219	8	-211	2	4	+2	1621	1774	+153
TOTAL		2341	2331	-10	5111	4783	-328	889	685	-204	862	1904	+1042	1849	4608	+2759	0	28	+28	2608	2290	-318	65	19	-26	13625	16388	+2763	

* No aerial photography for 750 acres pre-improvement
 * No aerial photography for pre-improvement
 * see Exclusion acreage for Sections J and K
 (Total aquatic and terrestrial acreage measurement, Pre=44611, Post=44966; Measurement difference= 353 acres or 0.8%)

ILLINOIS RIVER, POOL 24
 Changes Resulting from the High-Pool Channel Project
 Pre-Improvement (1927-1934) and Post-Improvement (1975-1977)
 Terrestrial Habitat Acreage

Section	Reach River Miles	Forest		Brush		Pasture		Sod		Agriculture		Developed		Mud Flats		Percented Wetlands		Total Terrestrial										
		Pre Post	Diff.	Pre Post	Diff.	Pre Post	Diff.	Pre Post	Diff.	Pre Post	Diff.	Pre Post	Diff.	Pre Post	Diff.	Pre Post	Diff.	Pre Post	Diff.	Pre Post	Diff.							
A	5 - 10	3032	1765	-1267	54	1	-53	0	0	0	2216	1916	-300	35	06	+31	0	2	+2	806	70	-816	6233	3640	-2593			
B	10 - 15	2000	2305	+305	82	82	0	0	0	1	-5	2064	2300	-236	46	221	+175	0	0	299	217	-82	6105	5704	-401			
C	15 - 20	1030	992	-38	22	0	-22	0	0	0	-8	1754	1725	-29	163	122	-21	0	0	68	205	+137	3025	3044	+19			
D	20 - 25	639	524	-115	14	8	-6	0	0	2	-2	211	198	-16	132	159	+27	0	0	215	85	-130	2216	974	-1242			
E	25 - 30	1291	1183	-108	33	0	-33	0	0	0	0	1237	1024	-213	97	104	+7	0	0	256	321	+65	2934	2632	-302			
F	30 - 35	519	637	+118	31	0	-31	24	0	0	0	246	344	+98	210	159	-60	0	0	13	172	+159	1052	1132	+80			
G	35 - 40	511	658	+147	13	8	-5	11	0	0	0	600	647	+47	62	8	-54	0	0	67	32	-35	2722	1353	+1369			
H	40 - 45	262	434	+172	17	38	-39	17	4	-13	0	748	735	-13	16	63	+29	0	0	22	+22	1120	1208	+88				
I	45 - 50	359	559	+200	32	3	-29	0	0	0	0	883	862	-21	5	0	-5	1	0	-1	53	0	-53	1333	1622	+289		
J	50 - 55	39	328	+289	9	0	0	0	0	0	0	56	222	+166	6	0	0	0	0	0	0	0	0	0	0			
K	55 - 60	638	638	0	11	0	0	0	0	0	0	239	239	0	0	0	0	0	0	0	0	0	0	0	0			
L	60 - 65	524	489	-35	16	64	+48	0	0	0	0	590	416	-174	0	98	+82	0	22	+22	0	47	+39	1144	1128	-16		
M	65 - 70	708	850	+142	97	6	-91	9	0	-9	0	241	95	-146	126	150	+24	1	0	-1	173	452	+279	1433	1551	+118		
N	70 - 75	672	381	-291	675	0	-675	0	0	0	-8	81	30	-51	20	131	+111	0	0	14	1128	+1114	1278	1600	+322			
O	75 - 80	762	887	+125	1069	0	-1069	0	0	268	0	-268	372	927	+555	44	32	-12	0	0	352	1804	+1452	2067	1232	+835		
TOTAL		13199	11574	-1625	2015	210	-1805	61	4	-57	298	1	-297	12074	11319	-755	953	1327	+1274	2	24	+22	2484	4137	+1653	31006	28704	-2302

See the aerial photography for 750 acres pre-improvement
 and the aerial photography for 750 acres post-improvement
 see Enclosure acreage for Section J and K
 (Total aquatic and terrestrial acreage measurement, Pre-44984, Post-44984; measurement difference= 353 acres at 0.02)

APPENDIX

B

**GRAPHS OF
HABITAT TYPES
BY RIVER AND
FIVE MILE
REACH**

UPPER MISSISSIPPI & LOWER ILLINOIS RIVERS

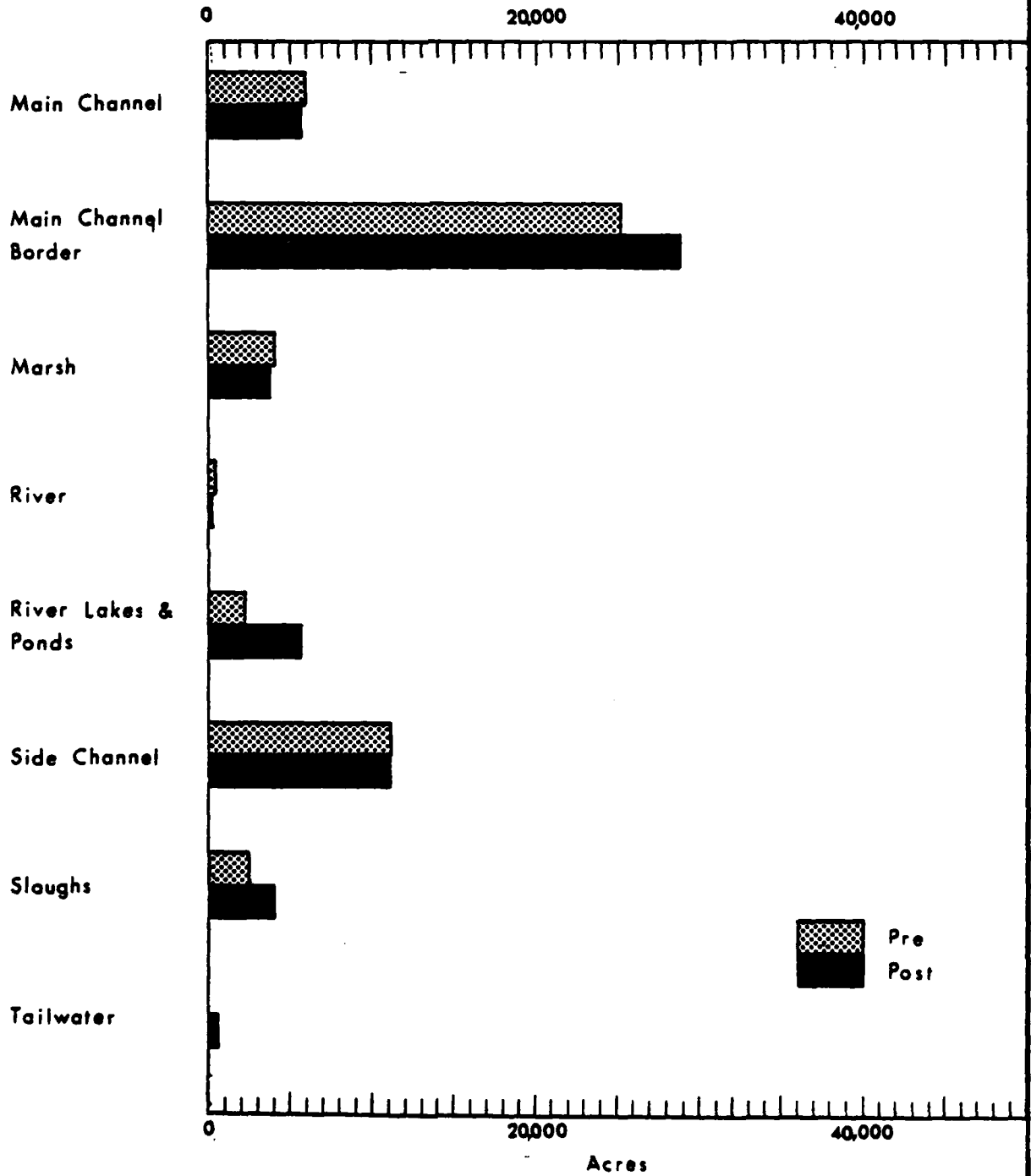
Graphs of the Total Study Area---Mississippi & Illinois Rivers
combined

AQUATIC HABITAT

Upper Mississippi and Lower Illinois Rivers, Pools 24, 25, & 26

Pre and Post Impoundment

(1927-1936) & (1975-1977)

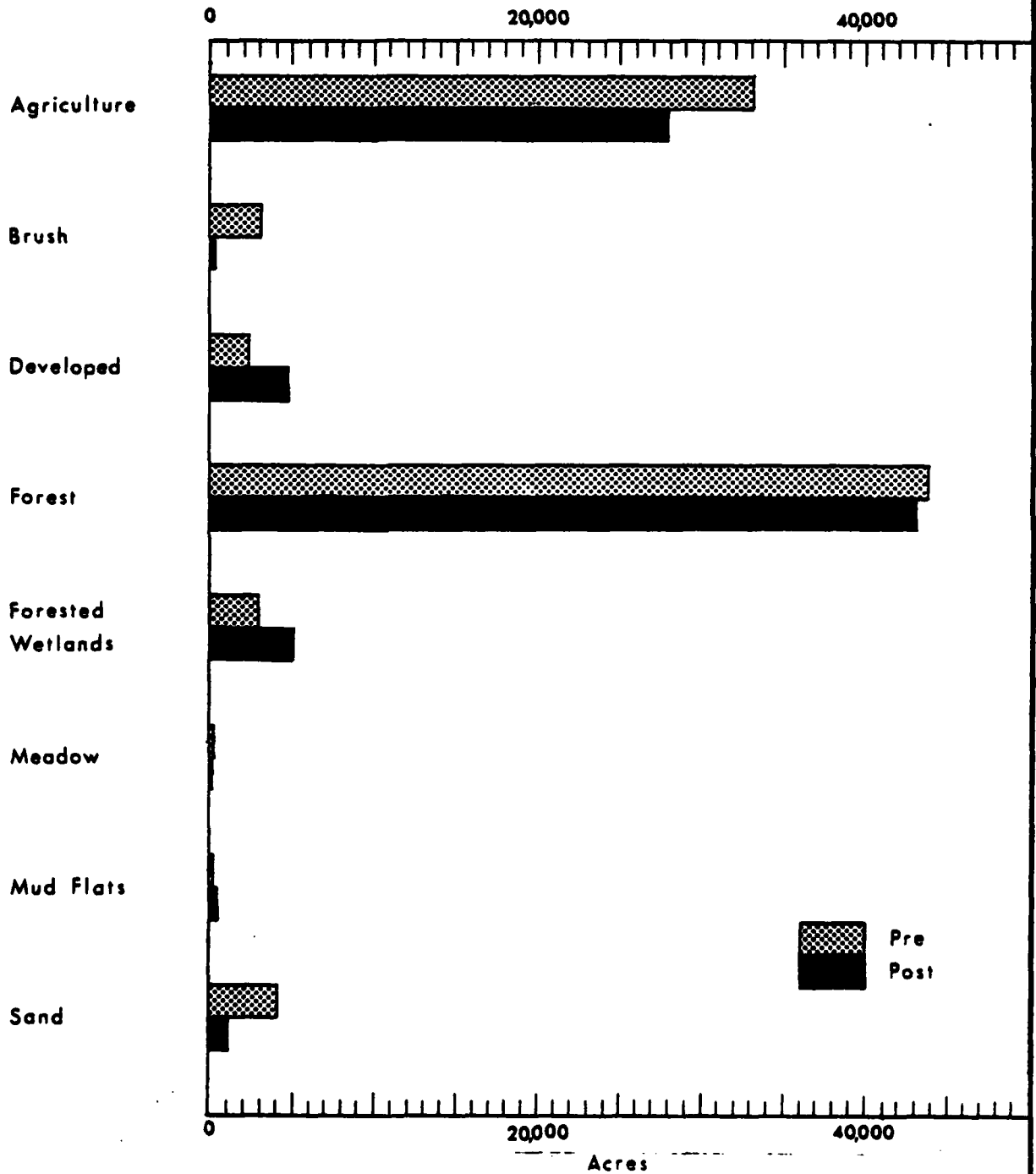


TERRESTRIAL HABITAT

Upper Mississippi and Lower Illinois Rivers, Pools 24, 25, 26

Pre and Post Impoundment

(1927-1936) & (1975-1977)



UPPER MISSISSIPPI & LOWER ILLINOIS RIVERS

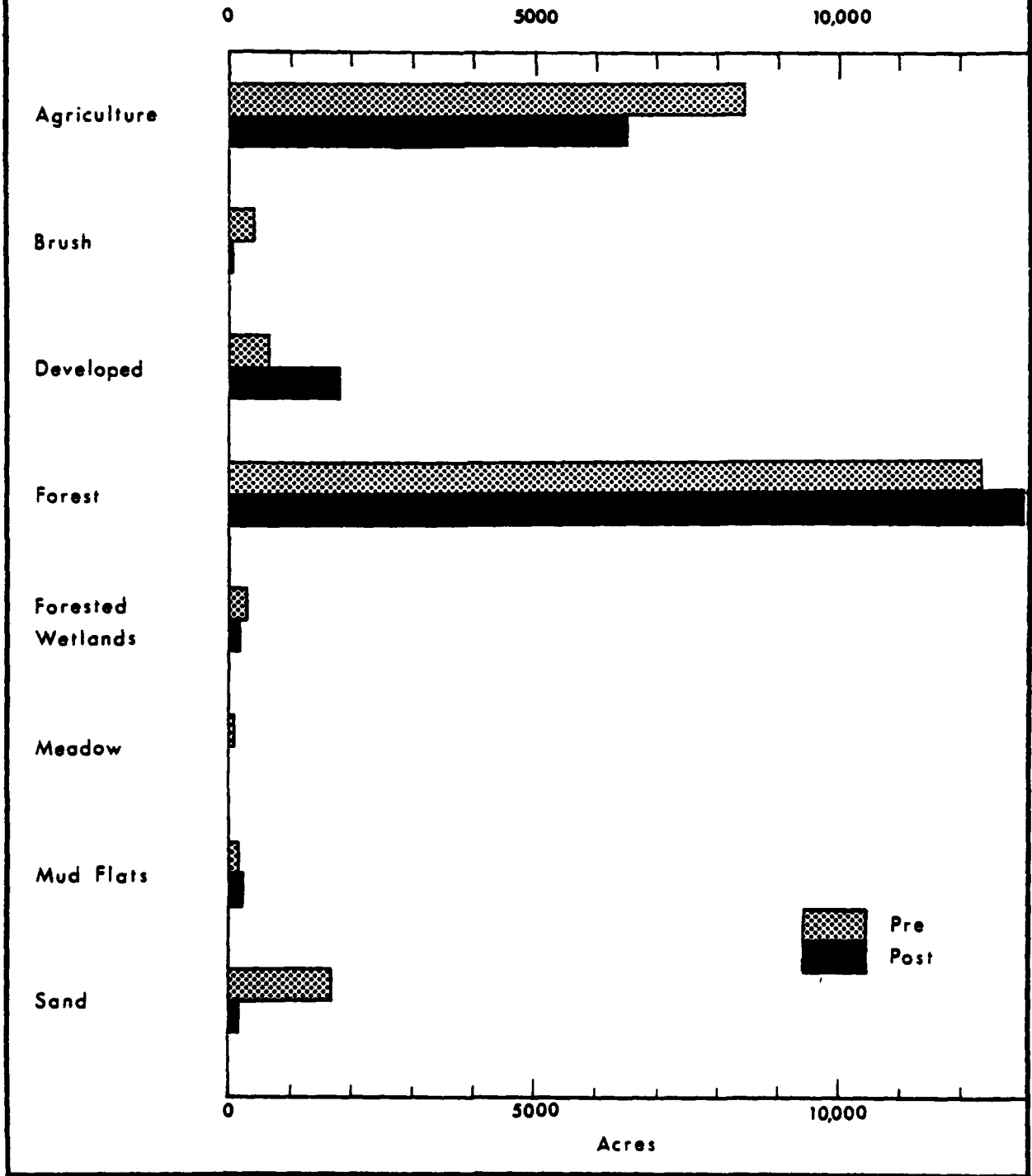
Graphs by Pools---24,25, & 26

TERRESTRIAL HABITAT

Mississippi River, Pool 26 -- Mile 202.6 to Mile 241.5

Pre and Post Impoundment

(1927-1936) & (1975-1977)

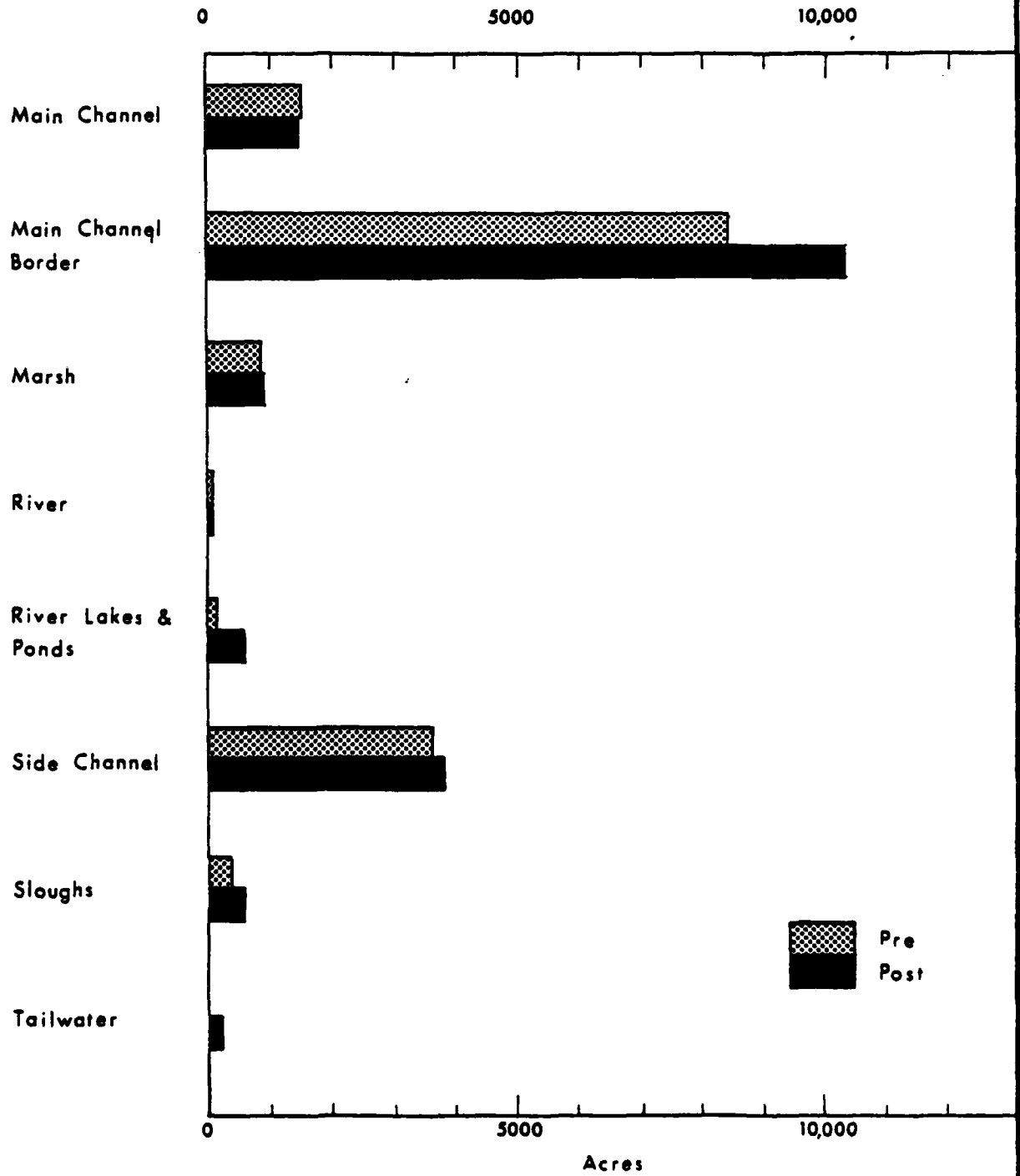


AQUATIC HABITAT

Mississippi River, Pool 26 -- Mile 202.6 to Mile 241.5

Pre and Post Impoundment

(1927-1936) & (1975-1977)

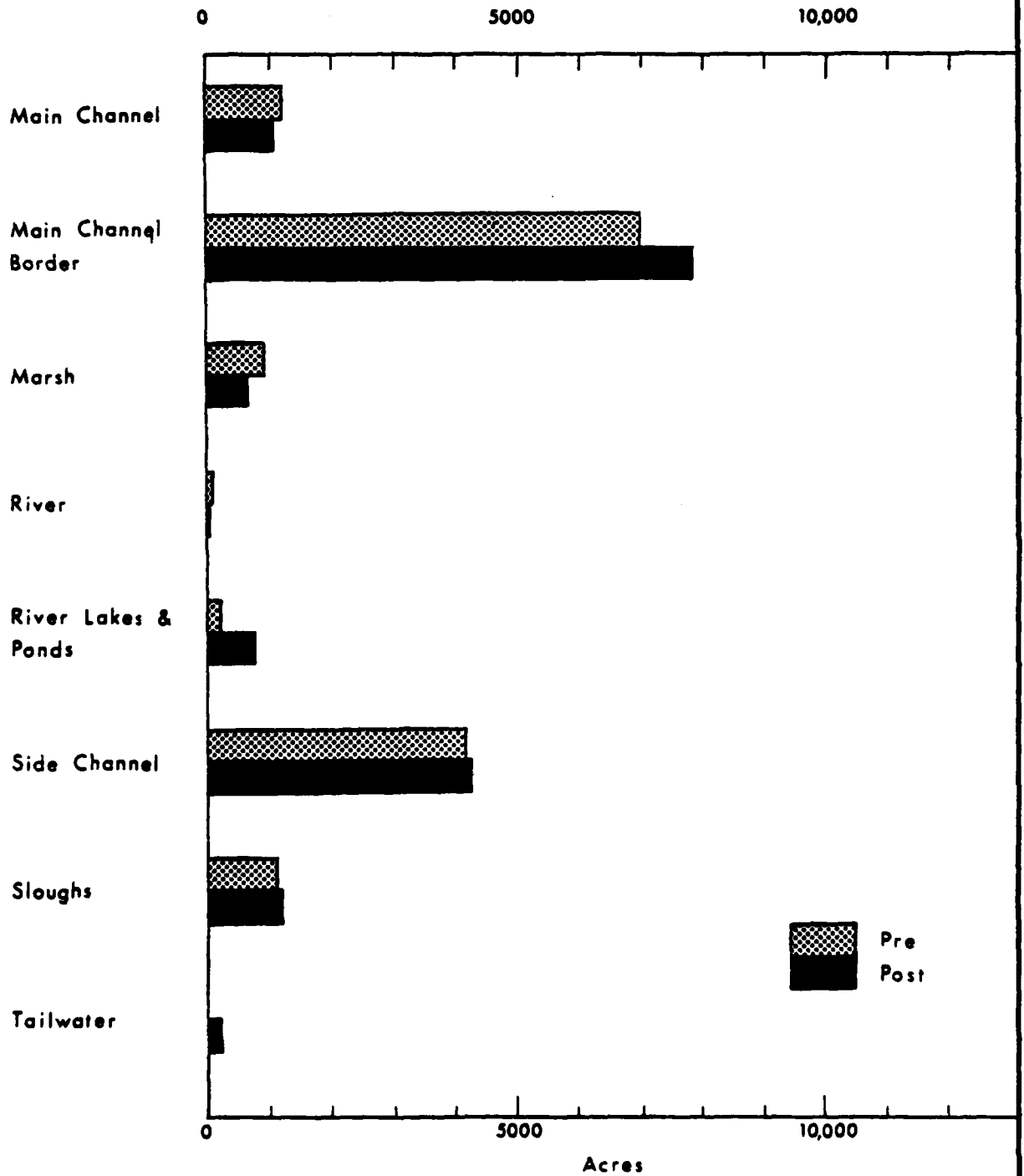


AQUATIC HABITAT

Mississippi River, Pool 25 -- Mile 241.5 to Mile 273.4

Pre and Post Impoundment

(1927 - 1936) & (1975 - 1977)

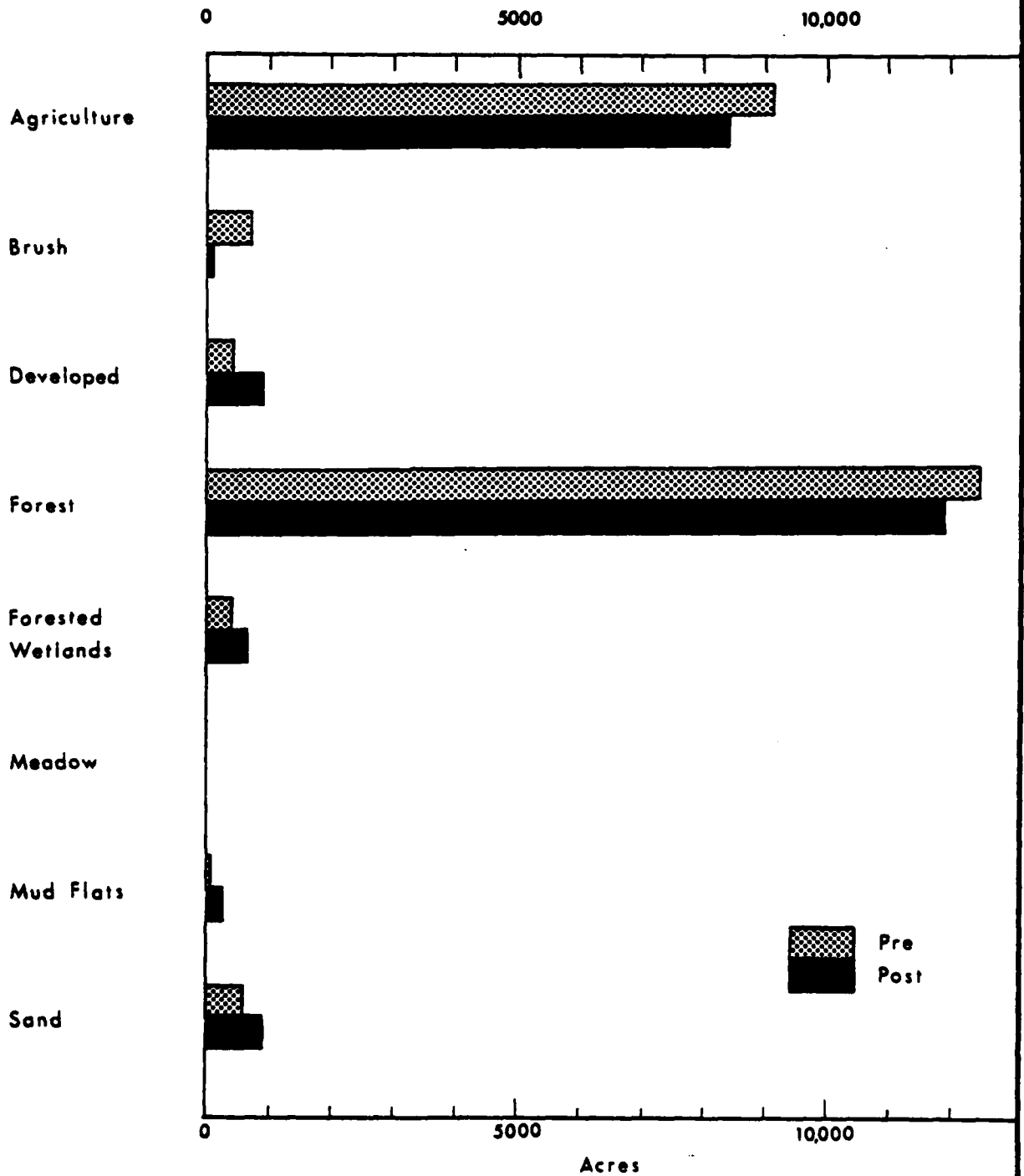


TERRESTRIAL HABITAT

Mississippi River, Pool 25 -- Mile 241.5 to Mile 273.4

Pre and Post Impoundment

(1927-1936) & (1975-1977)

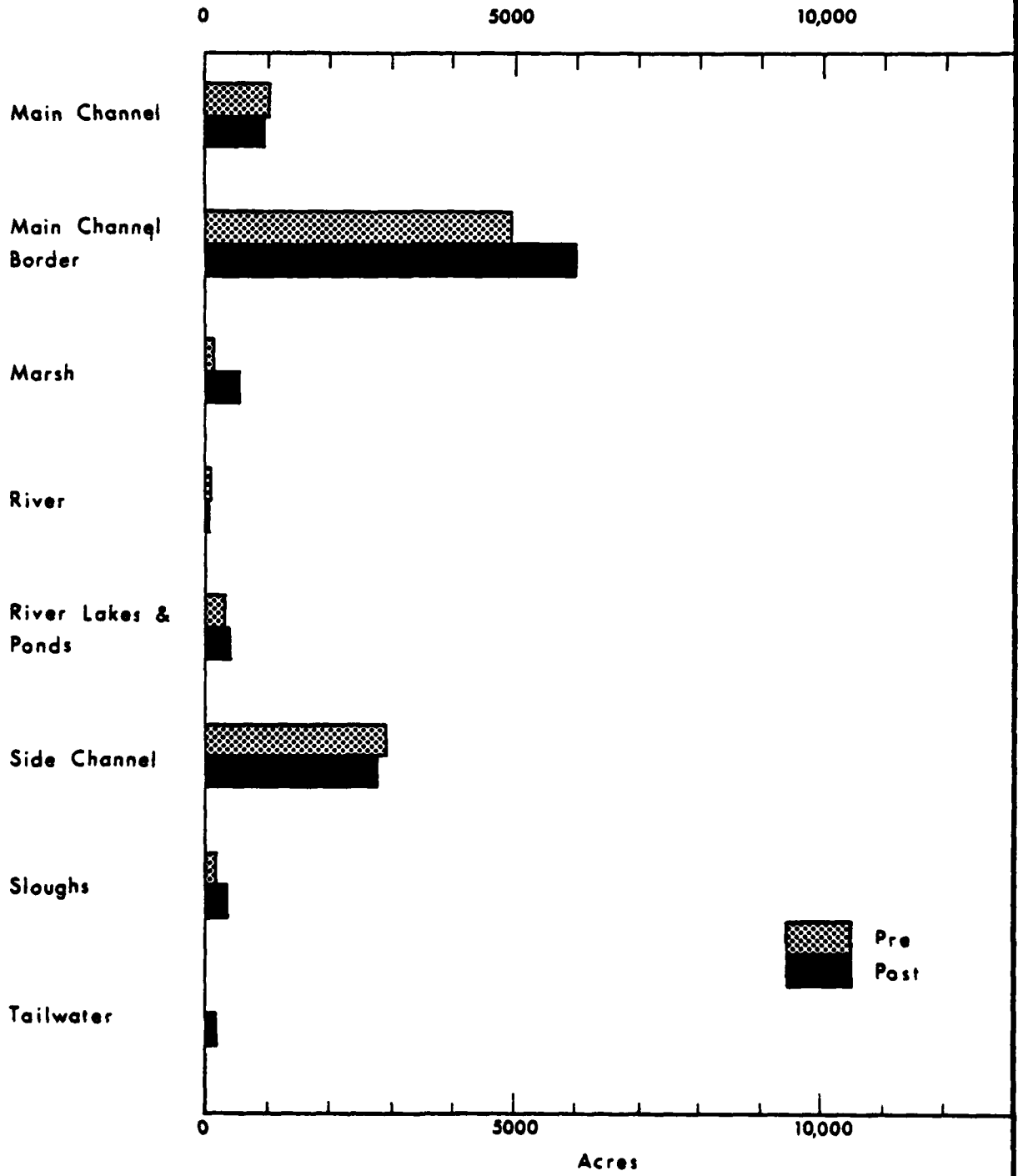


AQUATIC HABITAT

Mississippi River, Pool 24 -- Mile 273.4 to Mile 301.4

Pre and Post Impoundment

(1927 - 1936) & (1975 - 1977)

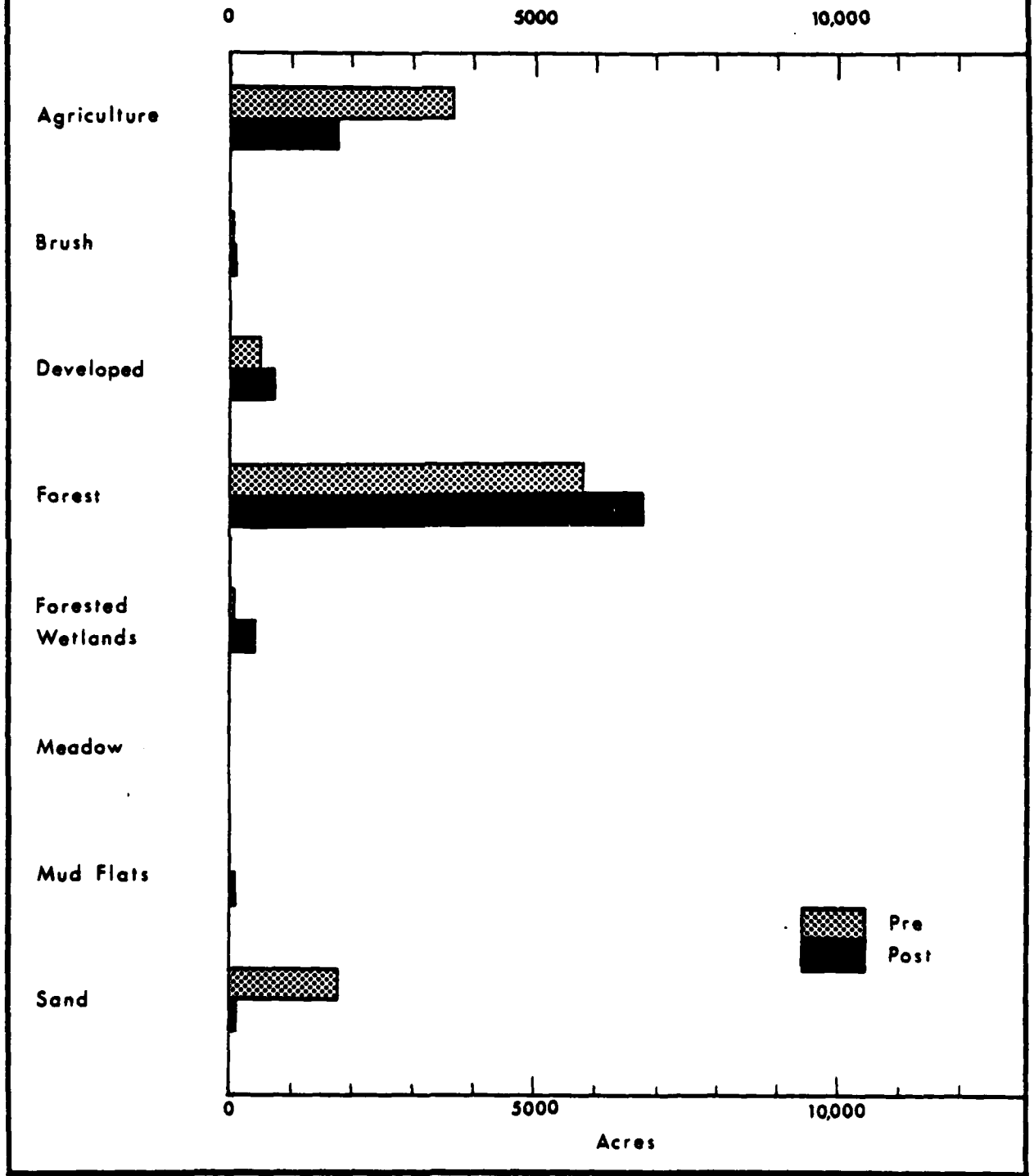


TERRESTRIAL HABITAT

Mississippi River, Pool 24 -- Mile 273.4 to Mile 301.4

Pre and Post Impoundment

(1927 - 1936) & (1975 - 1977)



UPPER MISSISSIPPI & LOWER ILLINOIS RIVERS

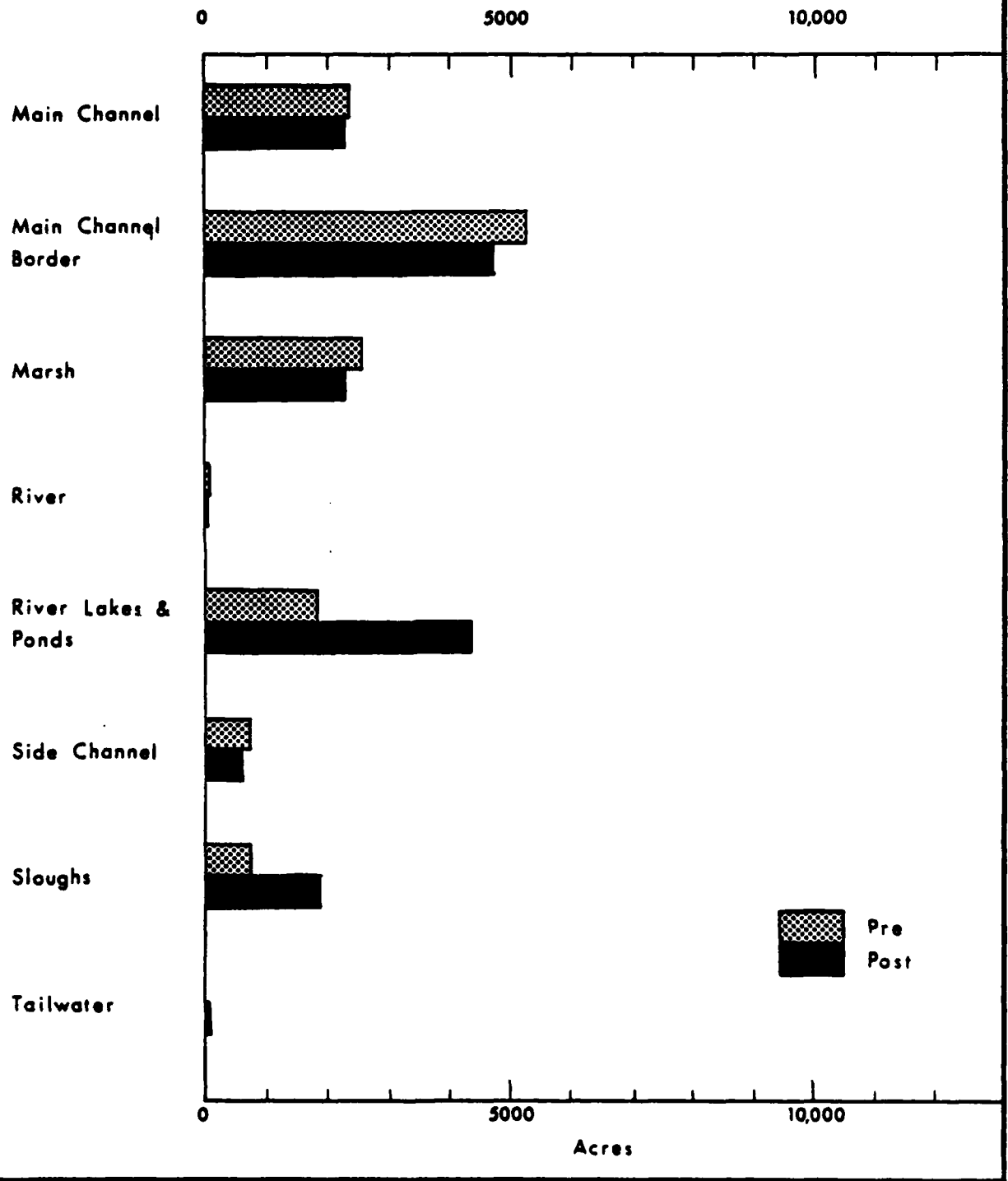
Graphs by Rivers---Mississippi & Illinois

AQUATIC HABITAT

Illinois River, Pool 26 -- Mile 5 to Mile 80

Pre and Post Impoundment

(1927-1936) & (1975-1977)

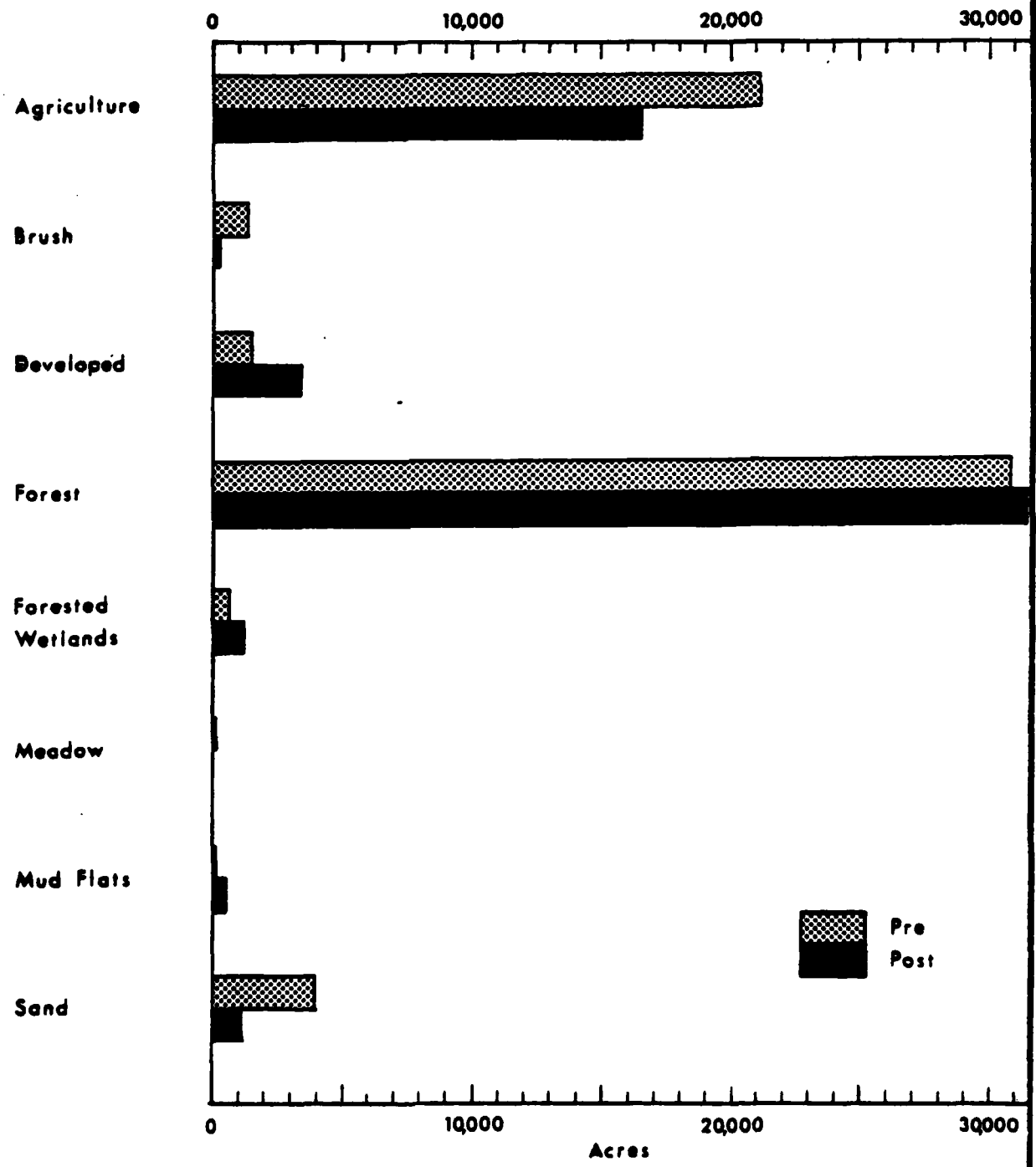


TERRESTRIAL HABITAT

Mississippi River, Pools 24-26 - Mile 202.6 to Mile 301.4

Pre and Post Impoundment

(1927-1936) & (1975-1977)

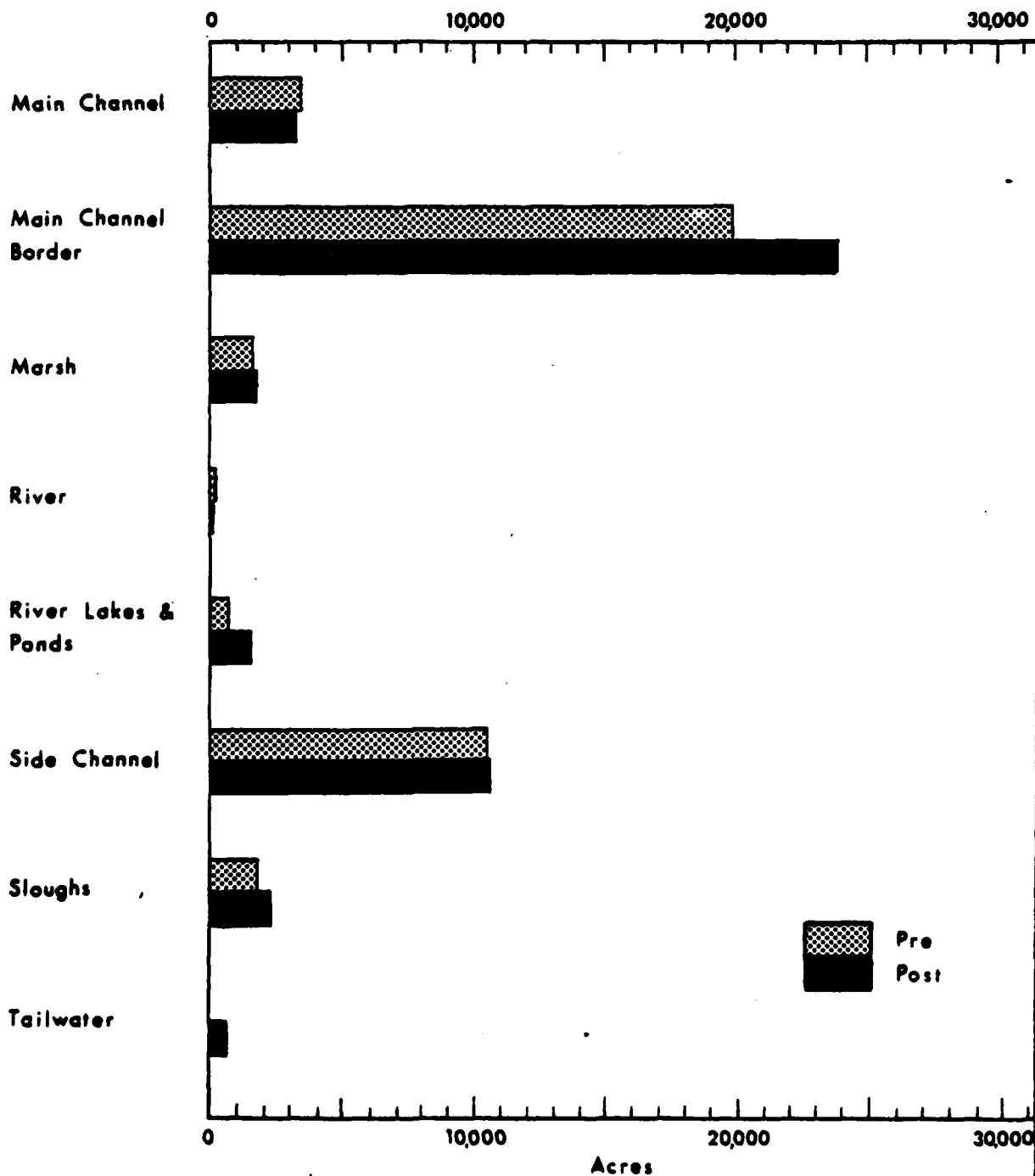


AQUATIC HABITAT

Mississippi River, Pools 24-26- Mile 202.6 to Mile 301.4

Pre and Post Impoundment

(1927-1936) & (1975-1977)

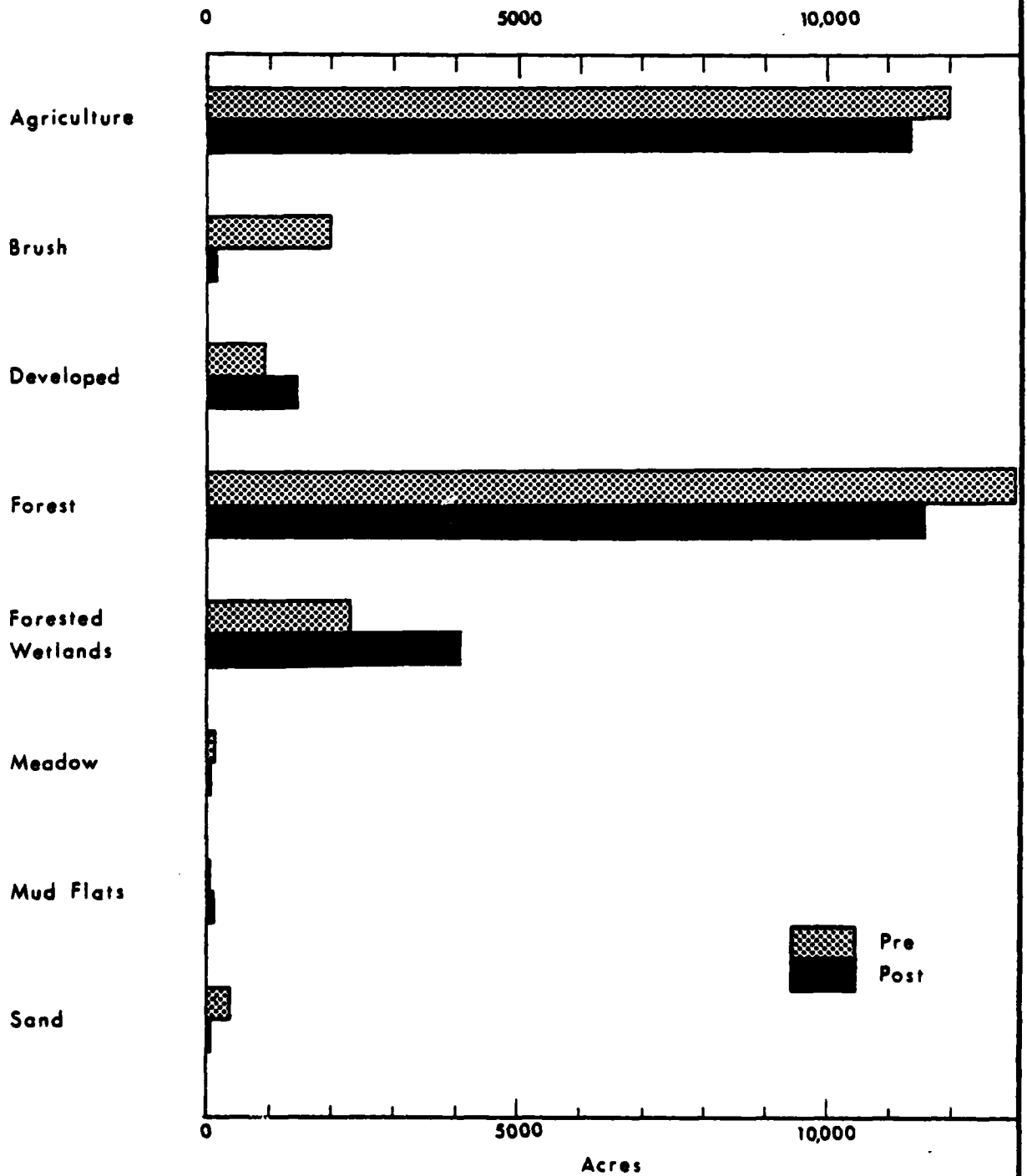


TERRESTRIAL HABITAT

Illinois River, Pool 26 -- Mile 5 to Mile 80

Pre and Post Impoundment

(1927 - 1936) & (1975 - 1977)



UPPER MISSISSIPPI RIVER, POOL 24

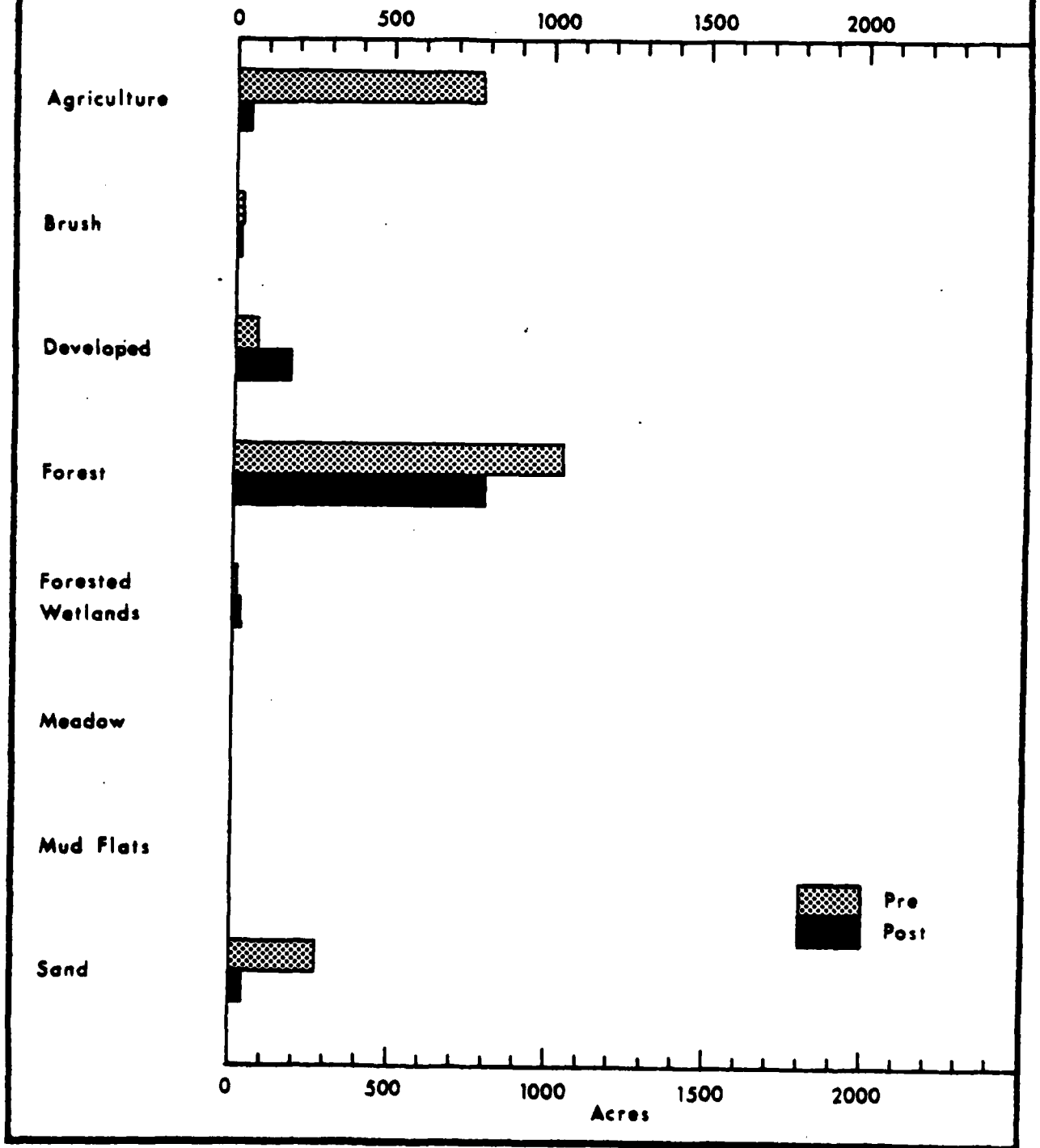
Graphs by 5 Mile Sections

TERRESTRIAL HABITAT

Mississippi River, Pool 24 -- Mile 273.4 to Mile 279

Pre and Post Impoundment

(1927-1936) & (1975-1977)

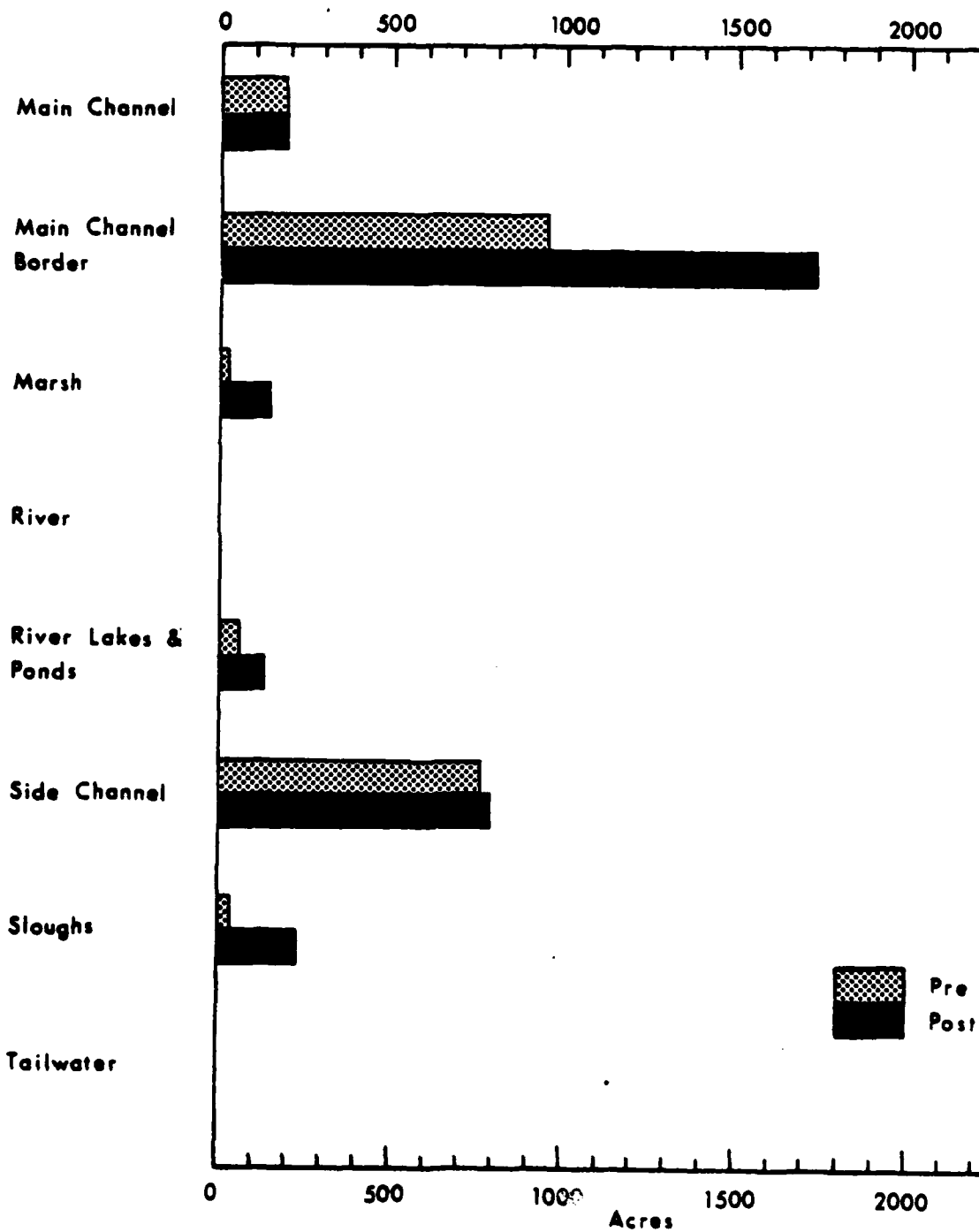


AQUATIC HABITAT

Mississippi River, Pool 24 -- Mile 273.4 to Mile 279

Pre and Post Impoundment

(1927-1936) & (1975-1977)

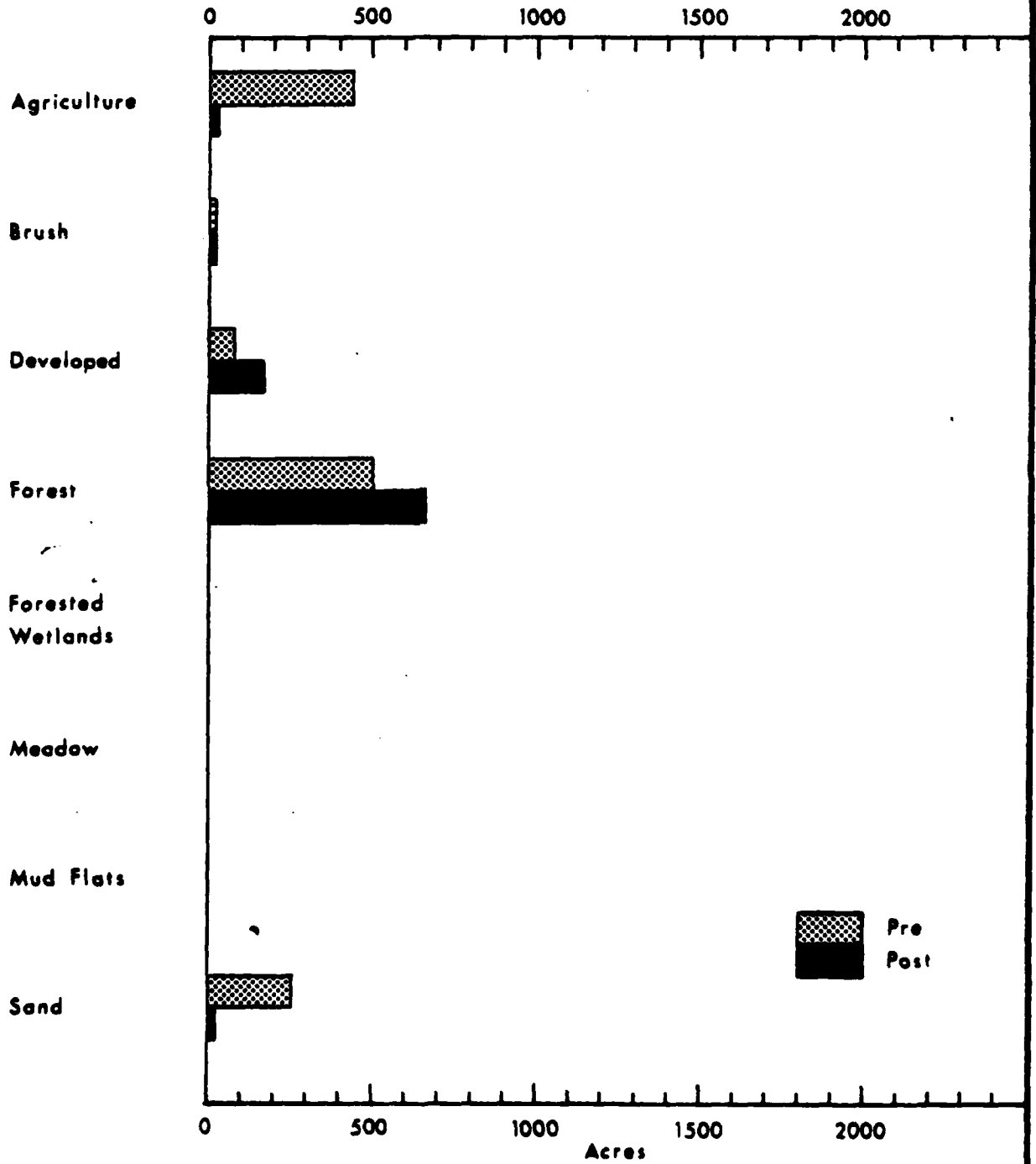


TERRESTRIAL HABITAT

Mississippi River, Pool 24 -- Mile 279 to Mile 284

Pre and Post Impoundment

(1927-1936) & (1975-1977)

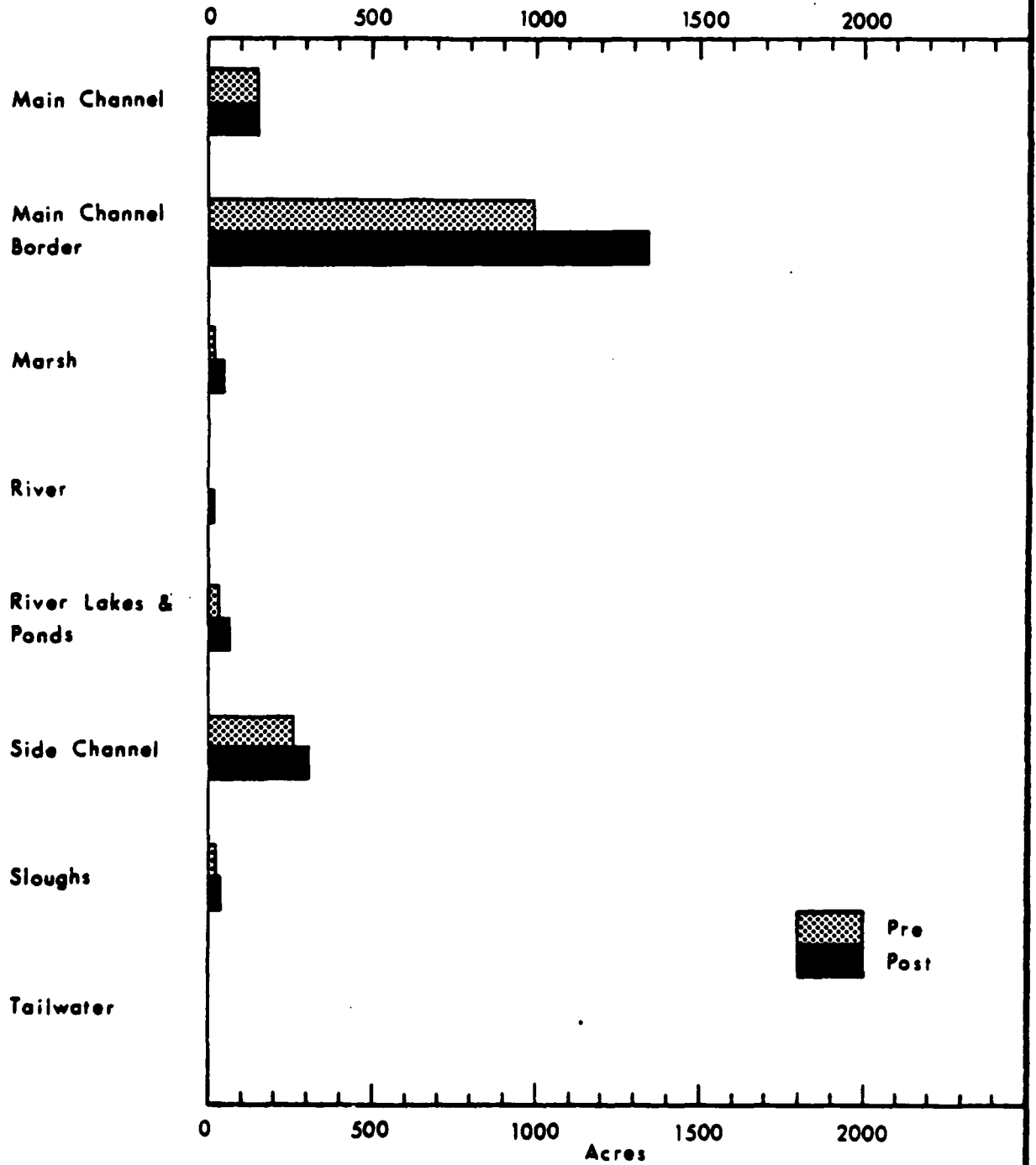


AQUATIC HABITAT

Mississippi River, Pool 24 -- Mile 279 to Mile 284

Pre and Post Impoundment

(1927-1936) & (1975-1977)

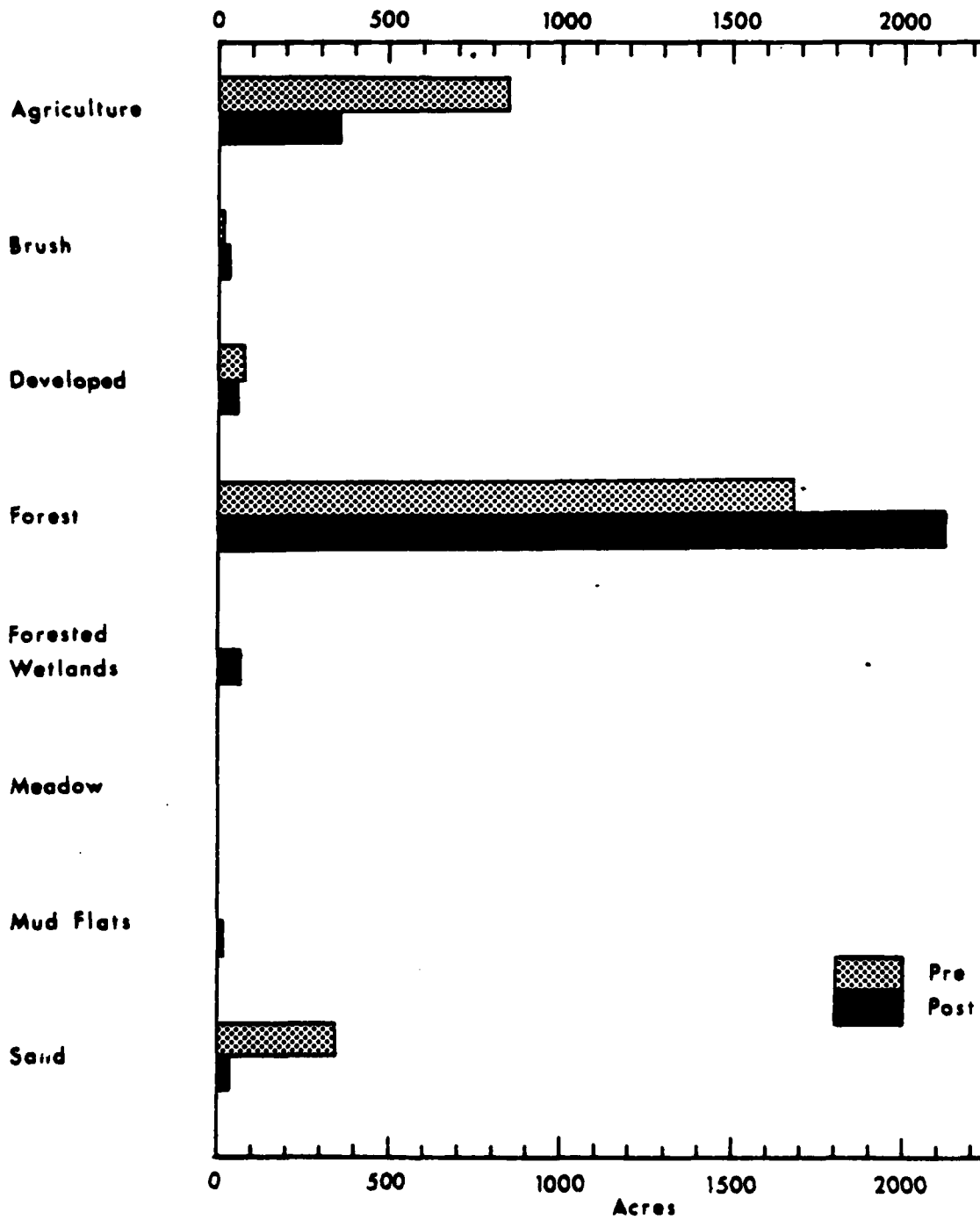


TERRESTRIAL HABITAT

Mississippi River, Pool 24 -- Mile 284 to Mile 289

Pre and Post Impoundment

(1927-1936) & (1975-1977)

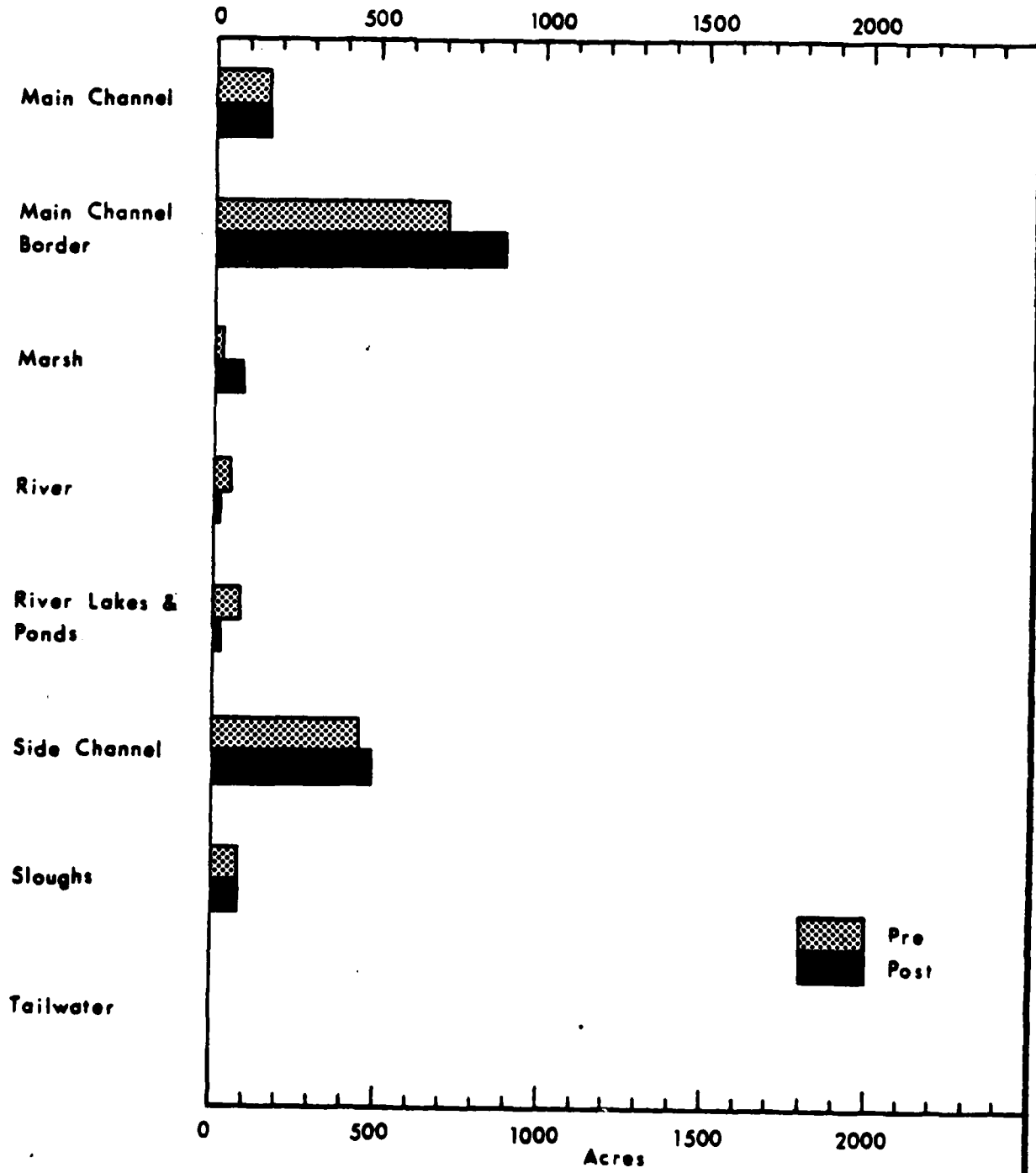


AQUATIC HABITAT

Mississippi River, Pool 24 -- Mile 284 to Mile 289

Pre and Post Impoundment

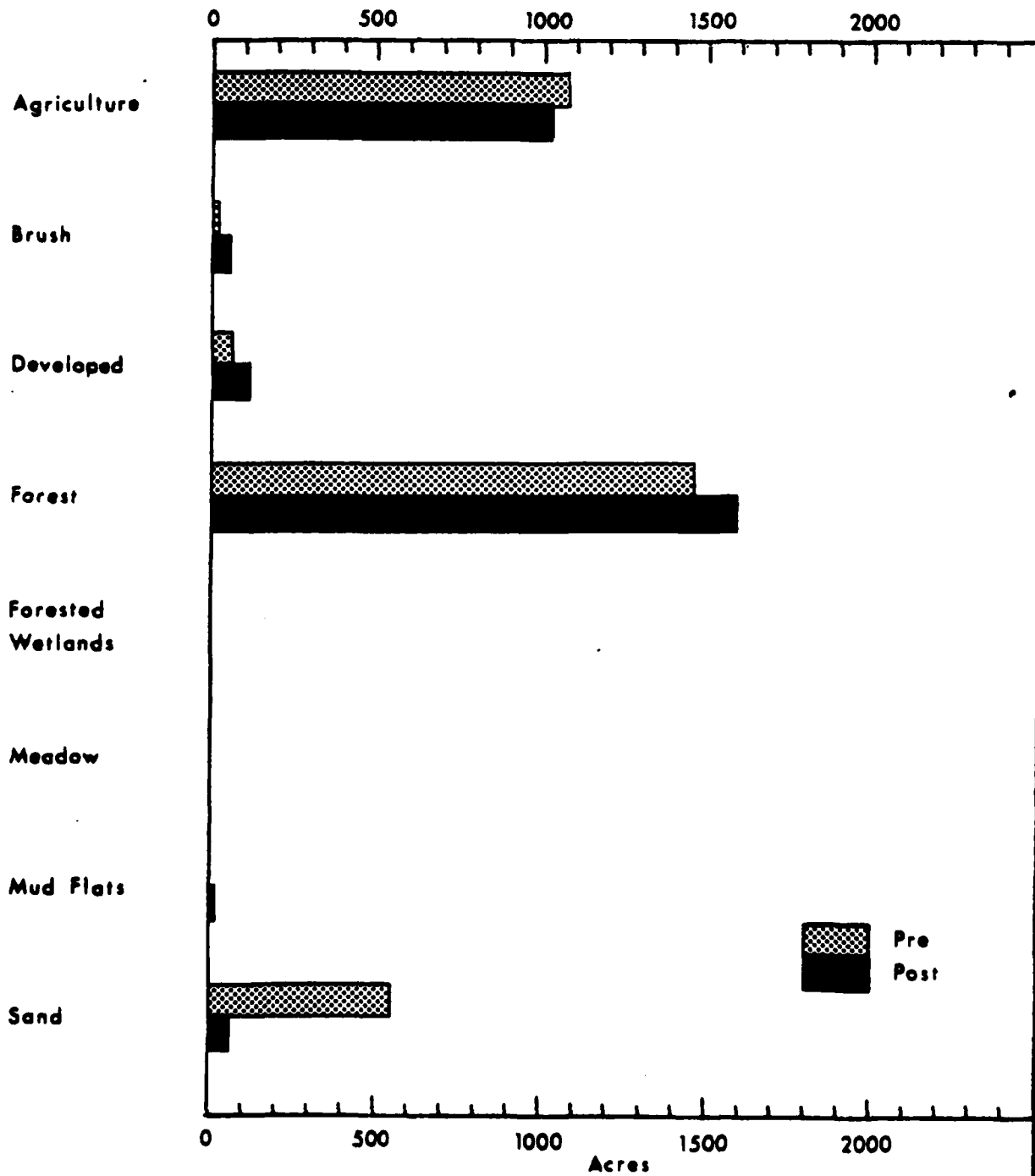
(1927 - 1936) & (1975 - 1977)



TERRESTRIAL HABITAT

Mississippi River, Pool 24 -- Mile 289 to Mile 294

Pre and Post Impoundment
(1927-1936) & (1975-1977)

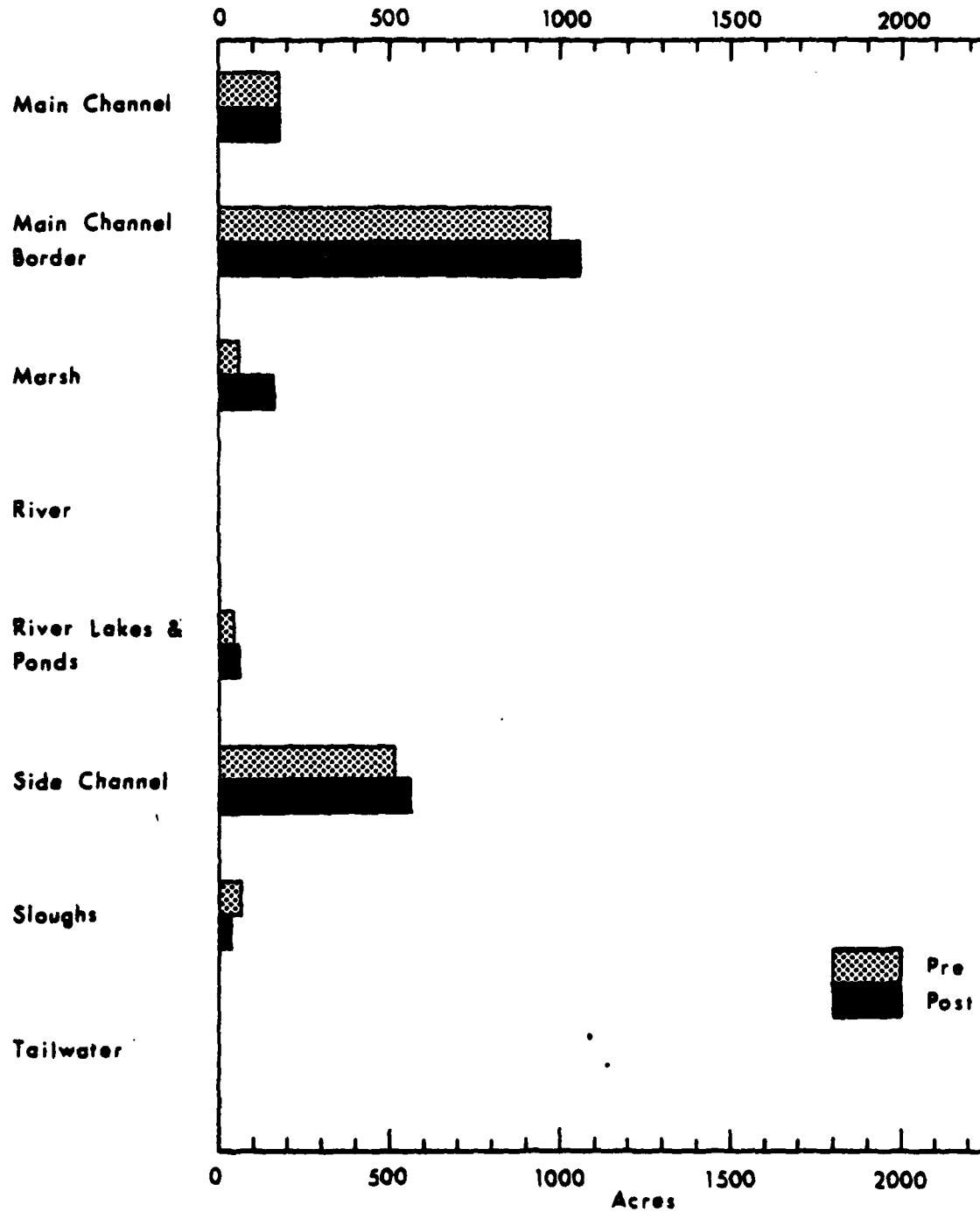


AQUATIC HABITAT

Mississippi River, Pool 24 -- Mile 289 to Mile 294

Pre and Post Impoundment

(1927-1936) & (1975-1977)

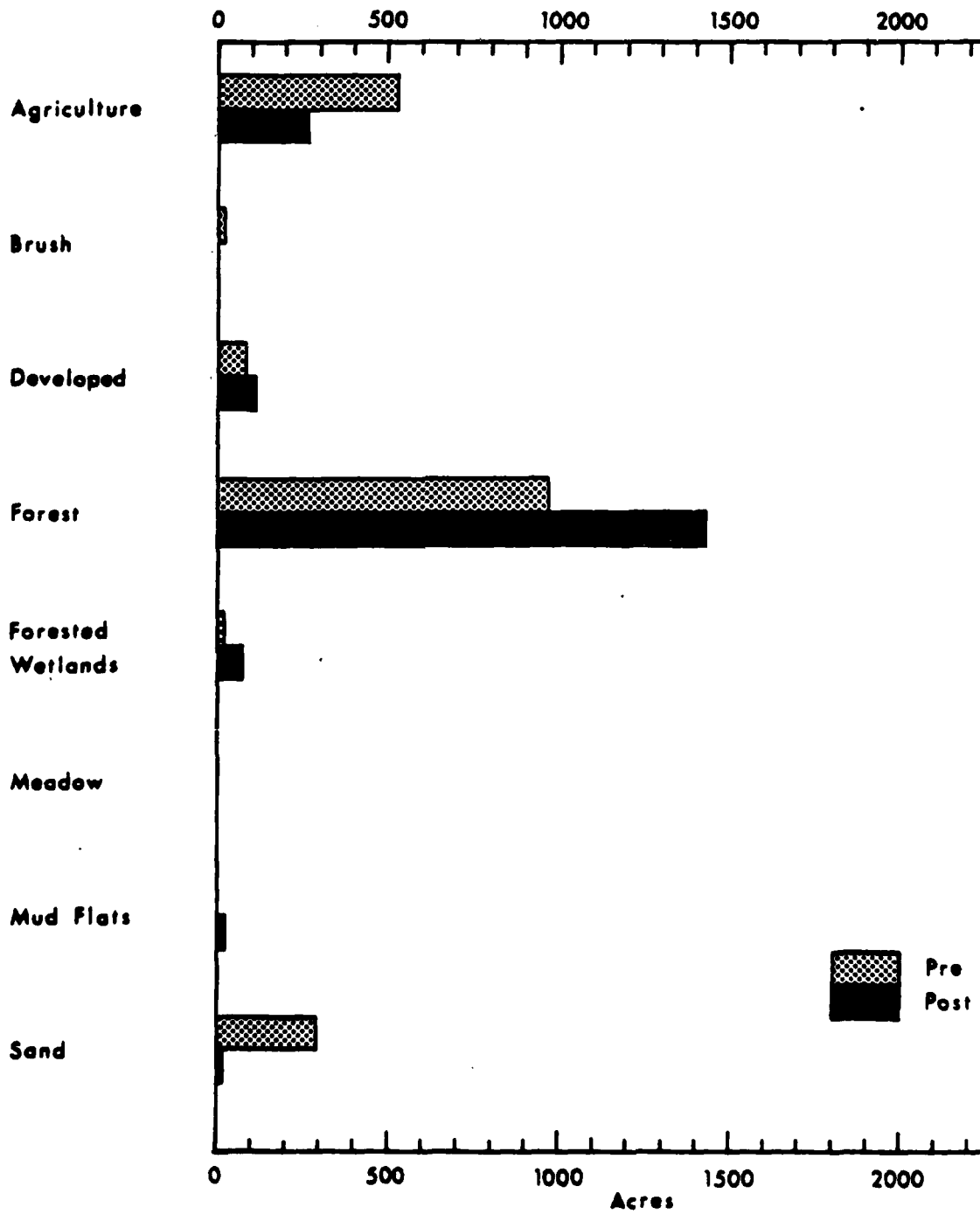


TERRESTRIAL HABITAT

Mississippi River, Pool 24 -- Mile 294 to Mile 299

Pre and Post Impoundment

(1927-1936) & (1975-1977)

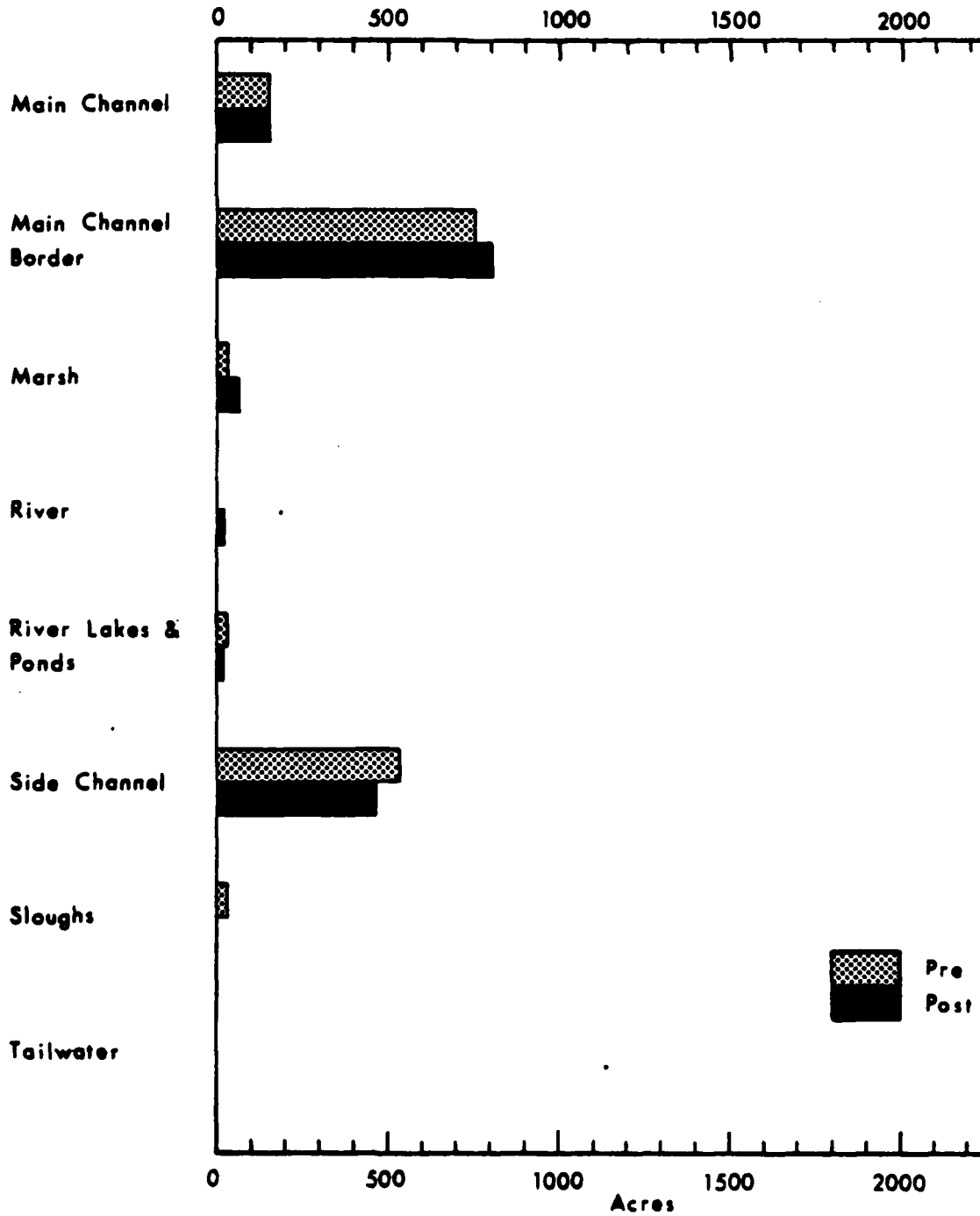


AQUATIC HABITAT

Mississippi River, Pool 24 -- Mile 294 to Mile 299

Pre and Post Impoundment

(1927-1936) & (1975-1977)

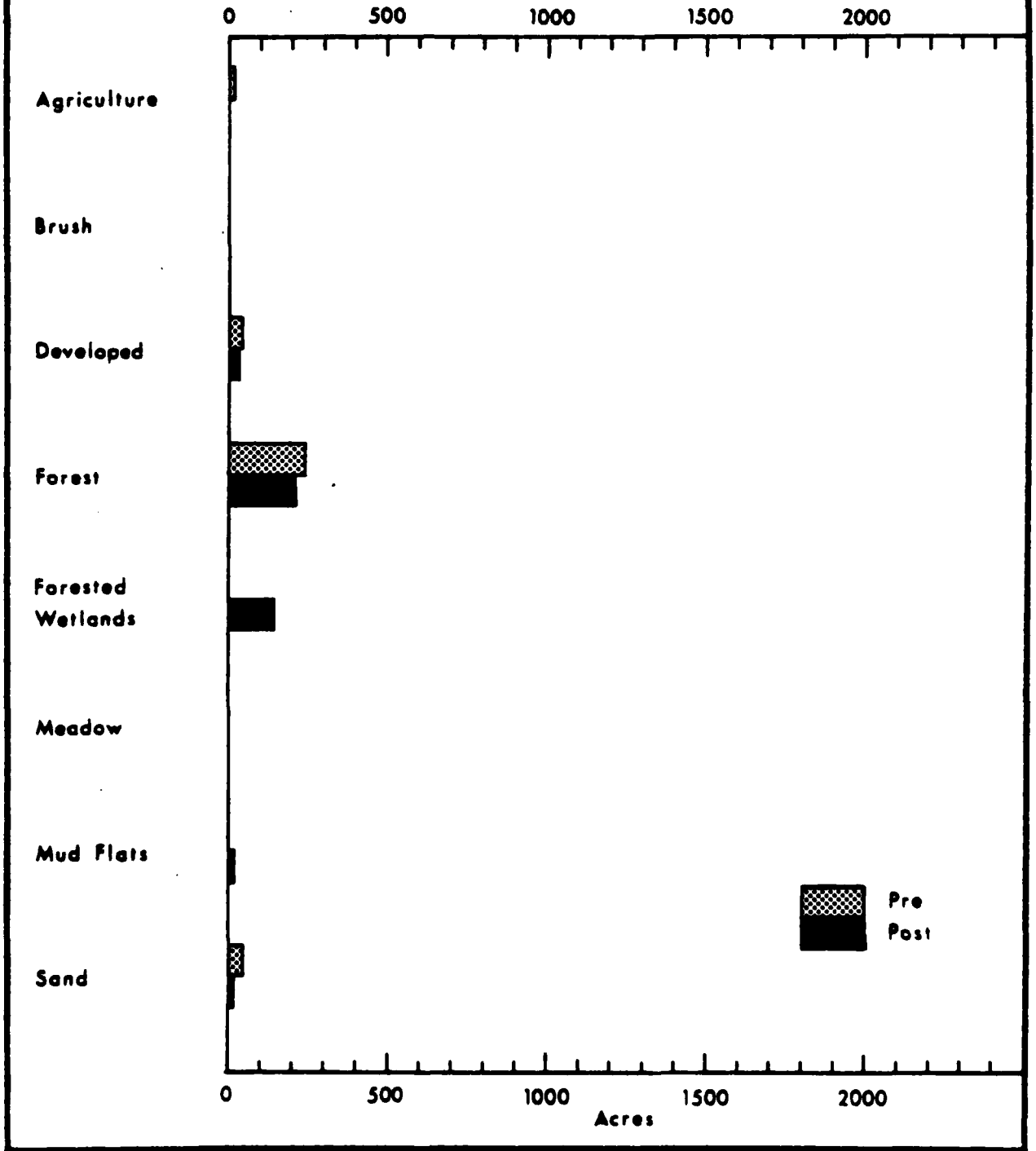


TERRESTRIAL HABITAT

Mississippi River, Pool 24 -- Mile 299 to Mile 301.4

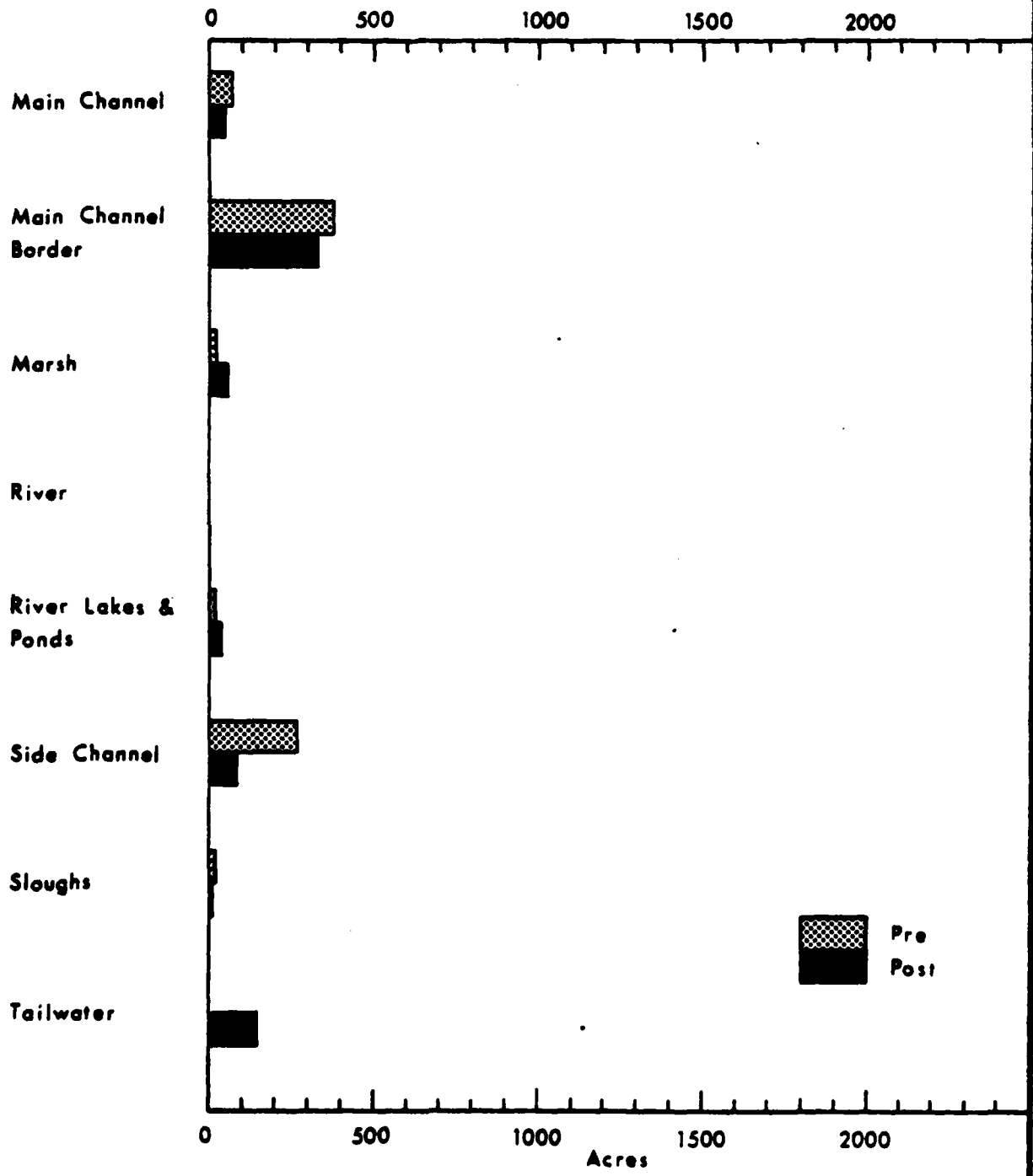
Pre and Post Impoundment

(1927-1936) & (1975-1977)



AQUATIC HABITAT

Mississippi River, Pool 24 -- Mile 299 to Mile 301.4
Pre and Post Impoundment
(1927 - 1936) & (1975 - 1977)



UPPER MISSISSIPPI RIVER, POOL 25

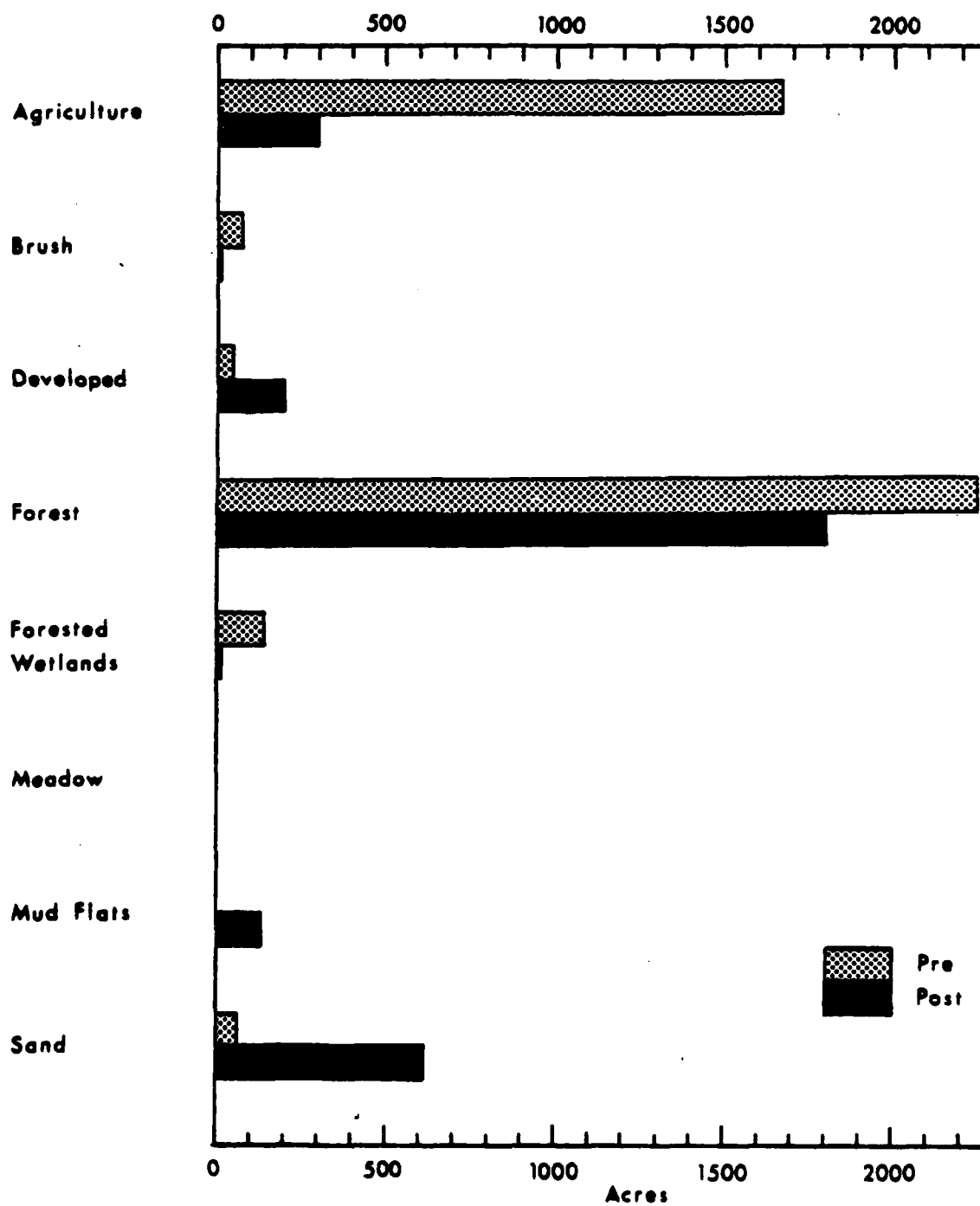
Graphs by 5 Mile Sections

TERRESTRIAL HABITAT

Mississippi River, Pool 25 -- Mile 241.5 to Mile 247

Pre and Post Impoundment

(1927-1936) & (1975-1977)

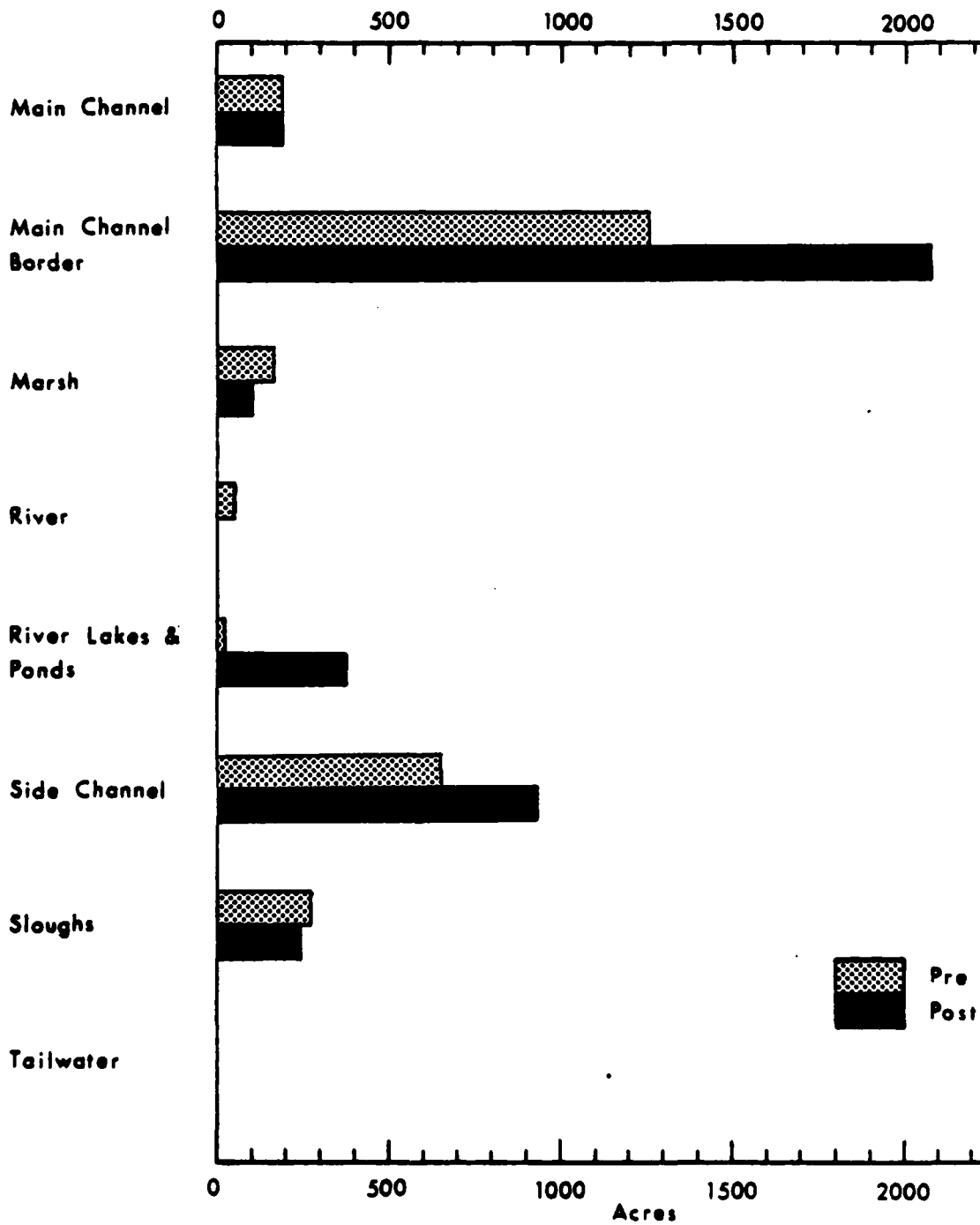


AQUATIC HABITAT

Mississippi River, Pool 25 -- Mile 241.5 to Mile 247

Pre and Post Impoundment

(1927-1936) & (1975-1977)

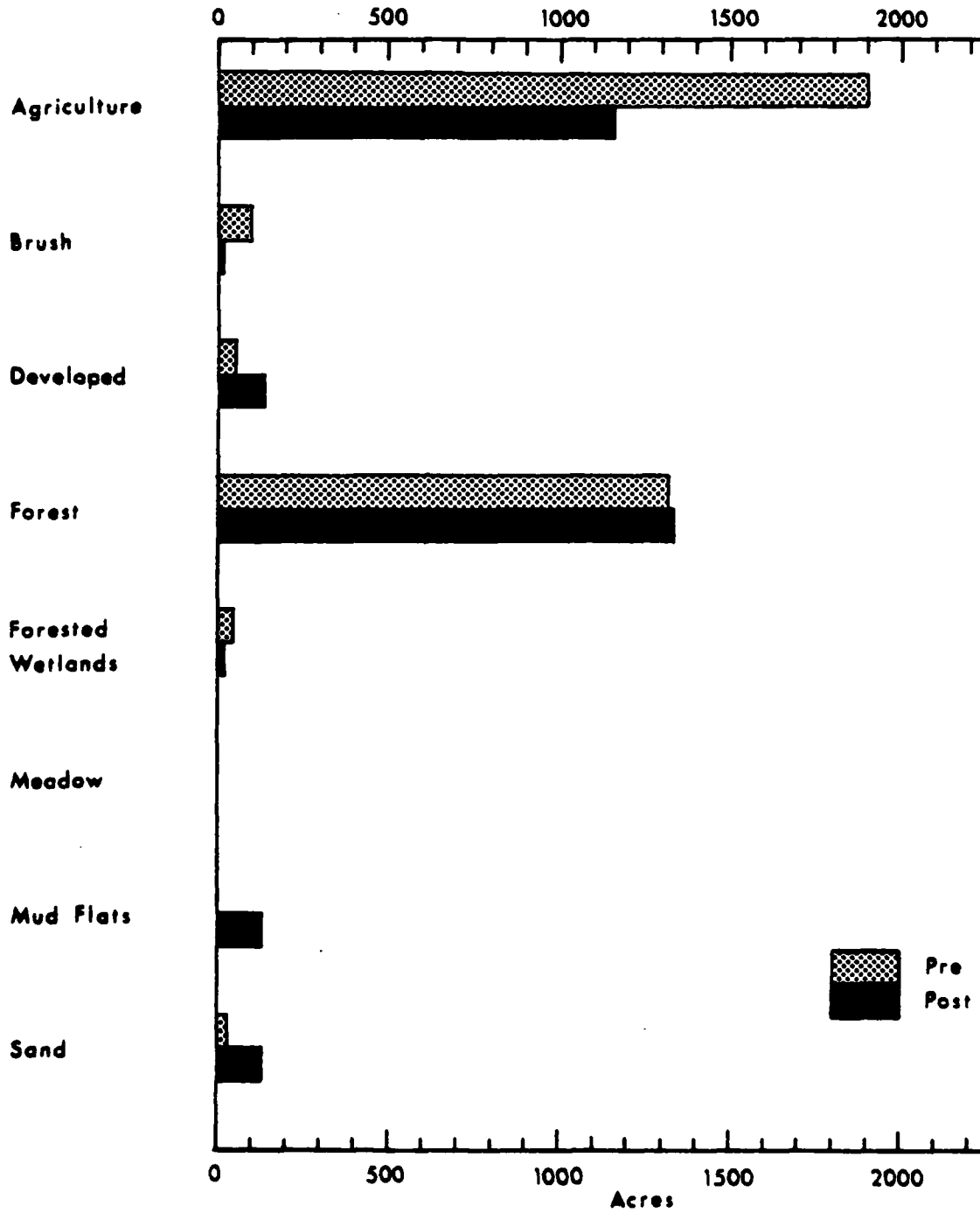


TERRESTRIAL HABITAT

Mississippi River, Pool 25 -- Mile 247 to Mile 252

Pre and Post Impoundment

(1927-1936) & (1975-1977)

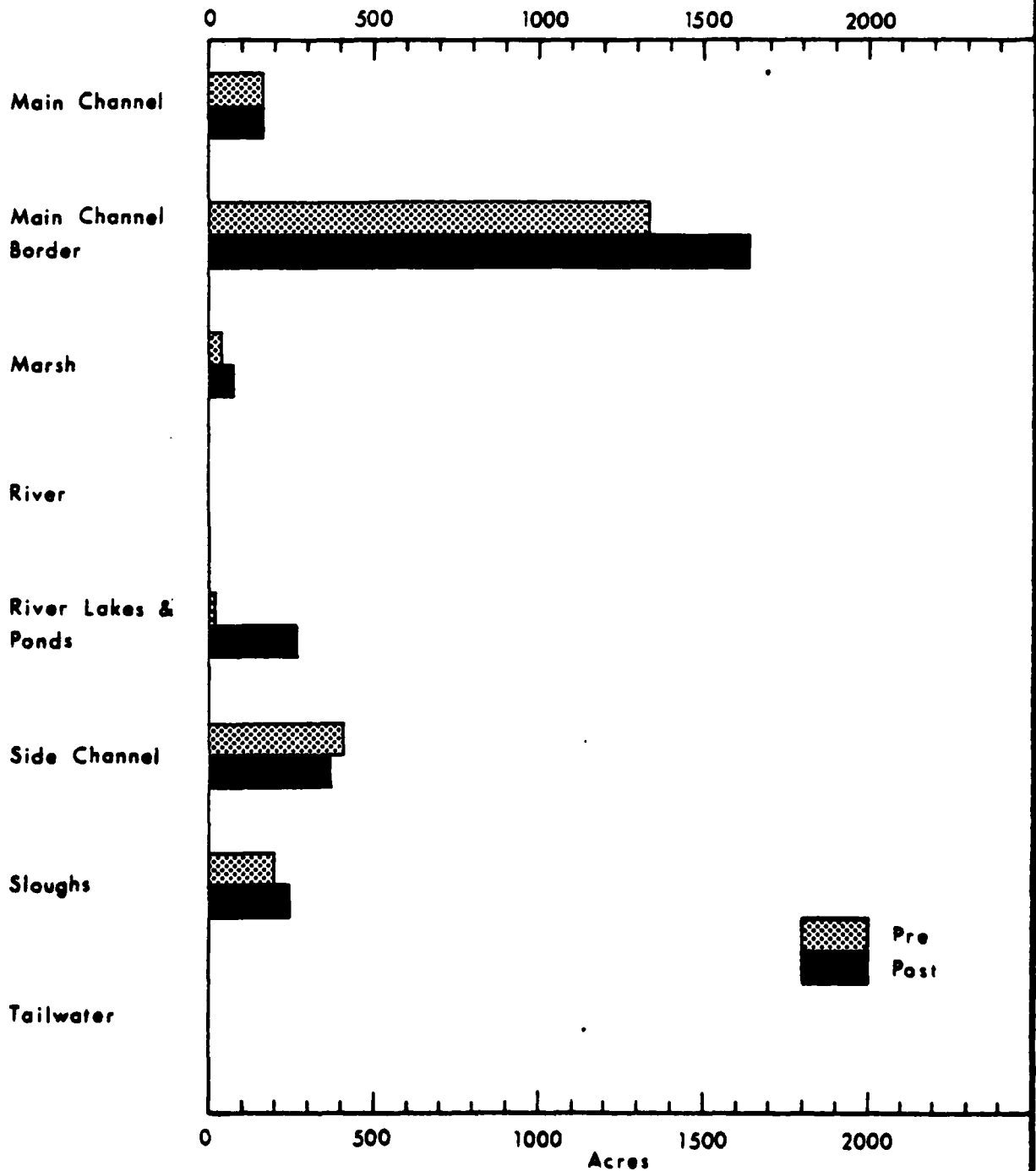


AQUATIC HABITAT

Mississippi River, Pool 25 -- Mile 247 to Mile 252 ✓

Pre and Post Impoundment

(1927-1936) & (1975-1977)

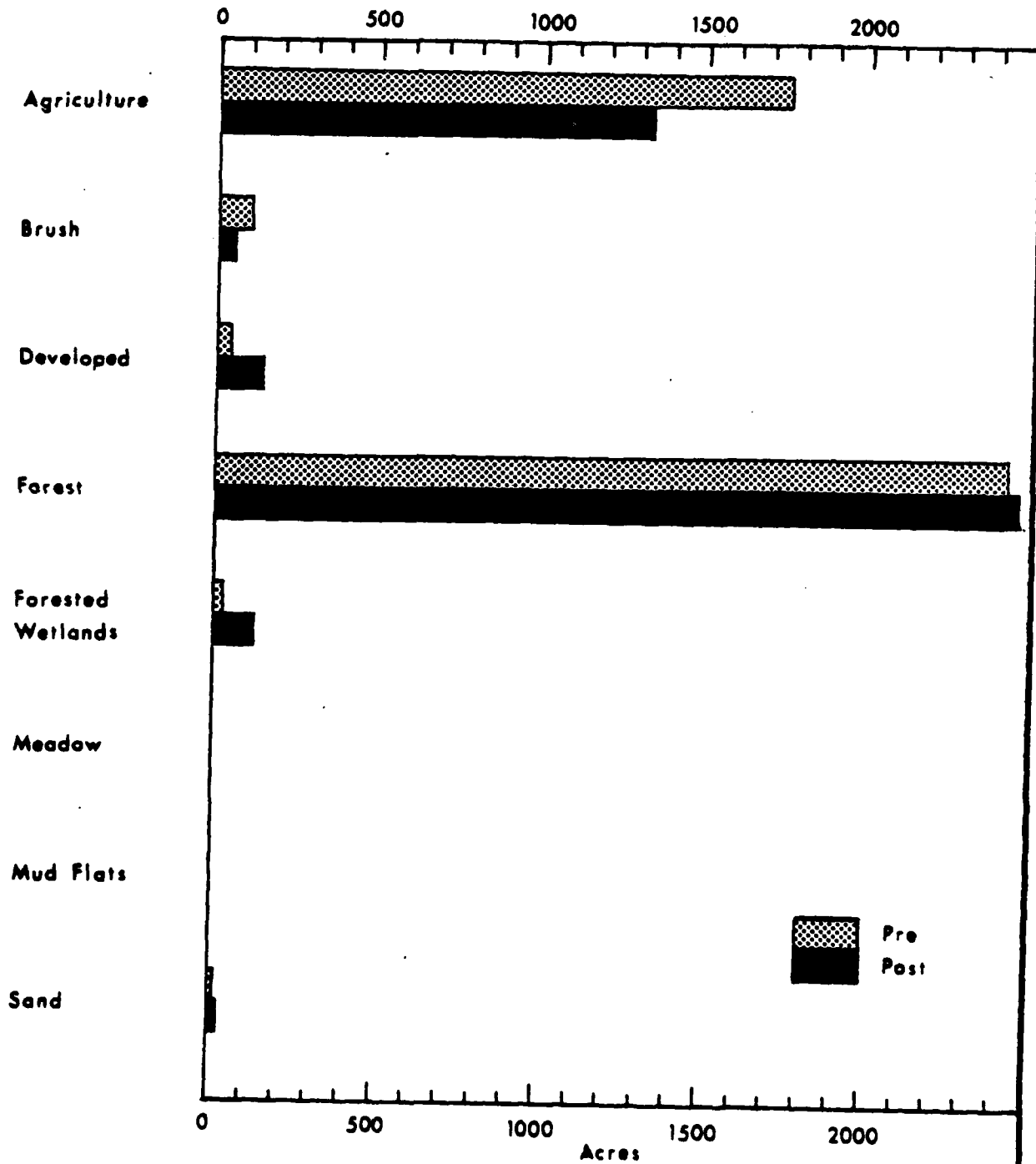


TERRESTRIAL HABITAT

Mississippi River, Pool 25 -- Mile 252 to Mile 257

Pre and Post Impoundment

(1927-1936) & (1975-1977)

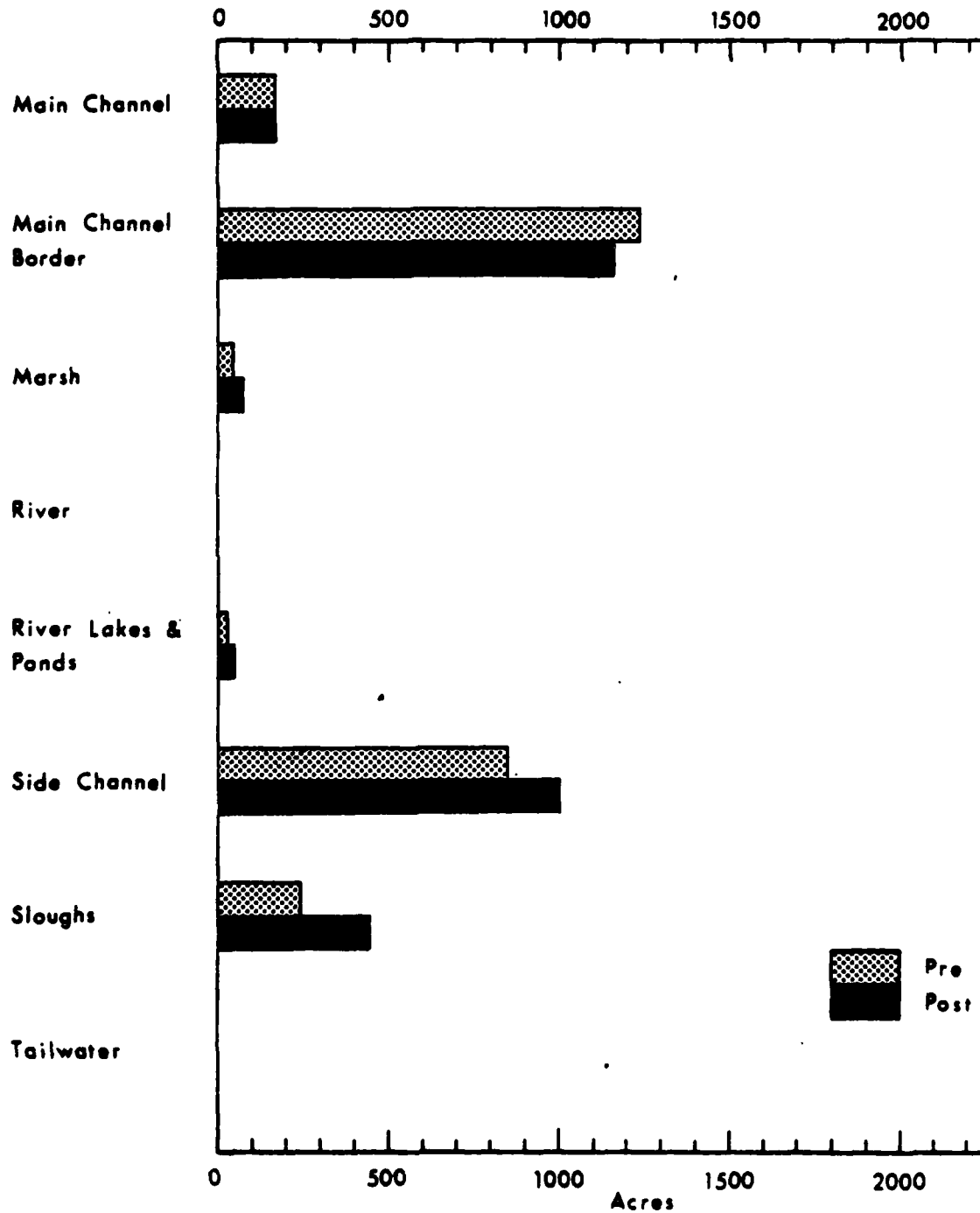


AQUATIC HABITAT

Mississippi River, Pool 25 -- Mile 252 to Mile 257

Pre and Post Impoundment

(1927-1936) & (1975-1977)

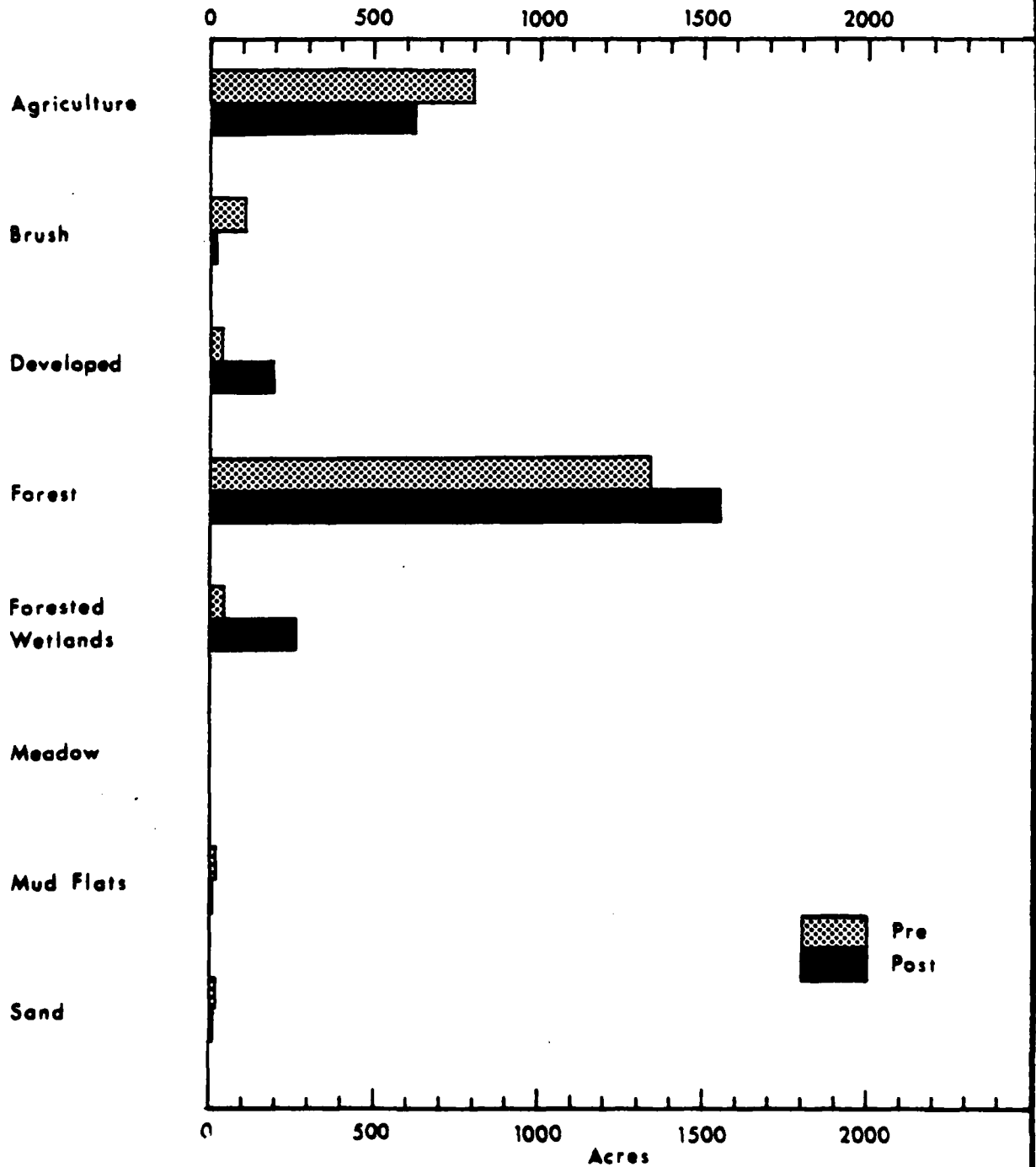


TERRESTRIAL HABITAT

Mississippi River, Pool 25 -- Mile 257 to Mile 262

Pre and Post Impoundment

(1927-1936) & (1975-1977)

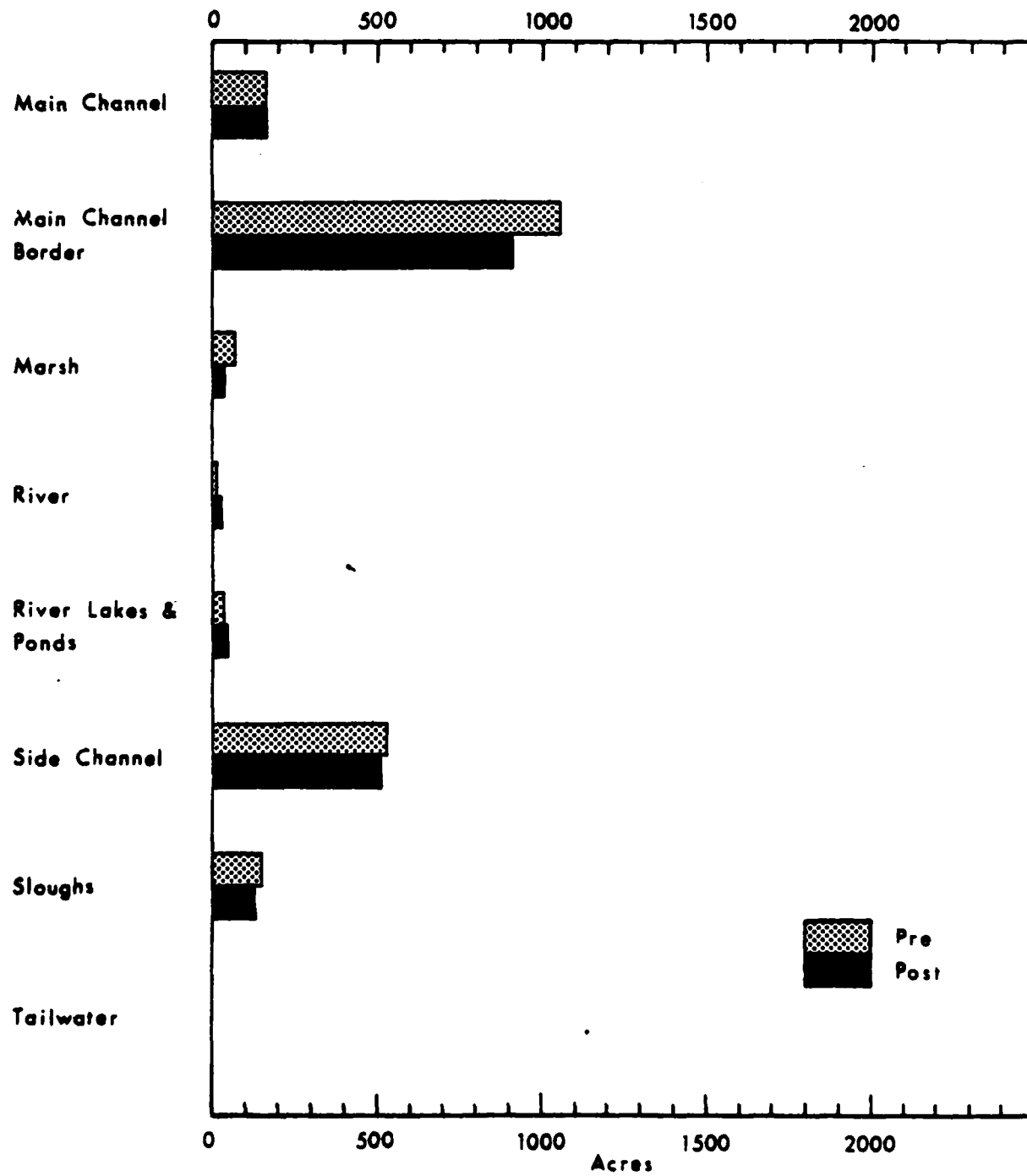


AQUATIC HABITAT

Mississippi River, Pool 25 -- Mile 257 to Mile 262

Pre and Post Impoundment

(1927-1936) & (1975-1977)

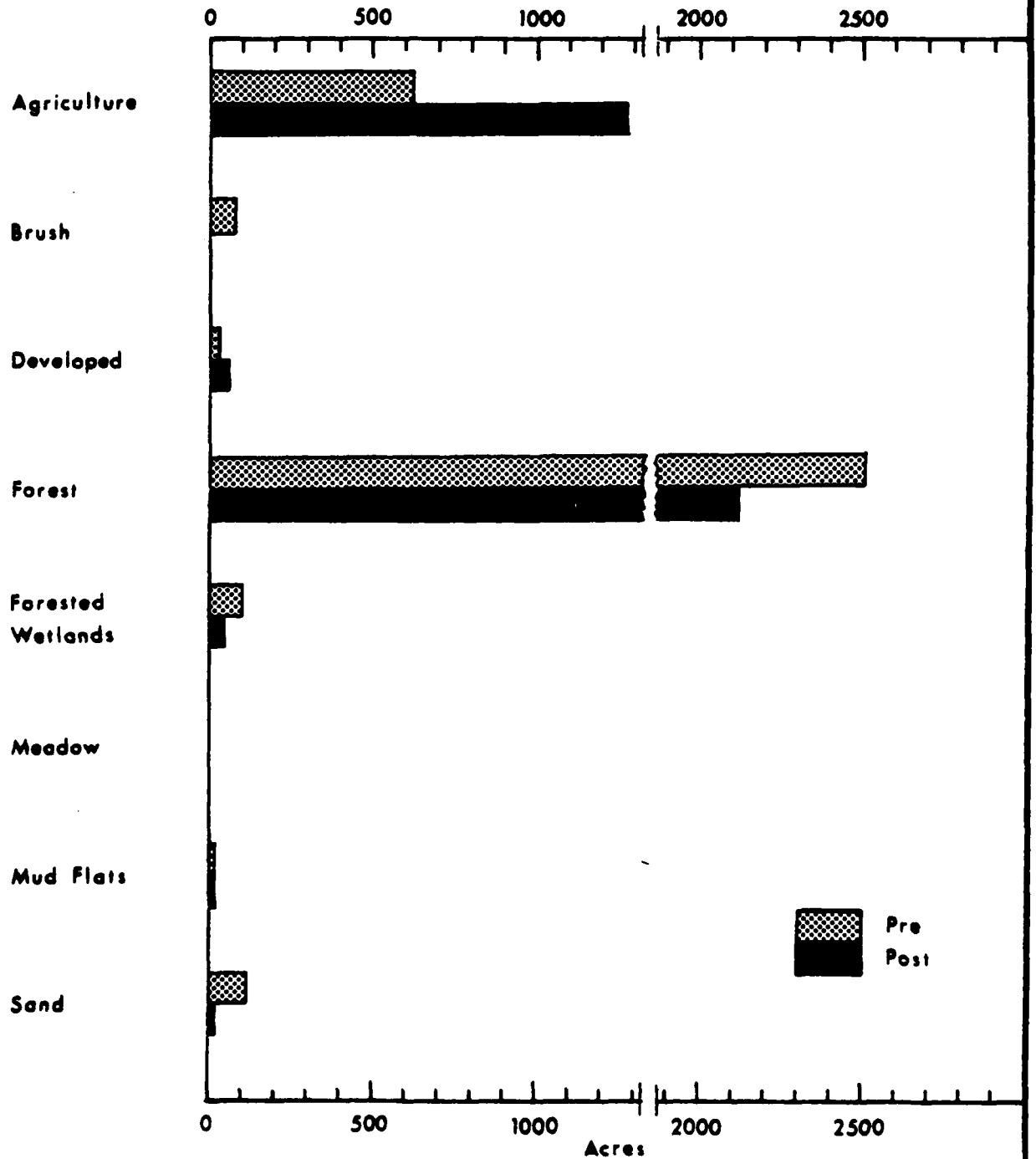


TERRESTRIAL HABITAT

Mississippi River, Pool 25 -- Mile 262 to Mile 267

Pre and Post Impoundment

(1927-1936) & (1975-1977)

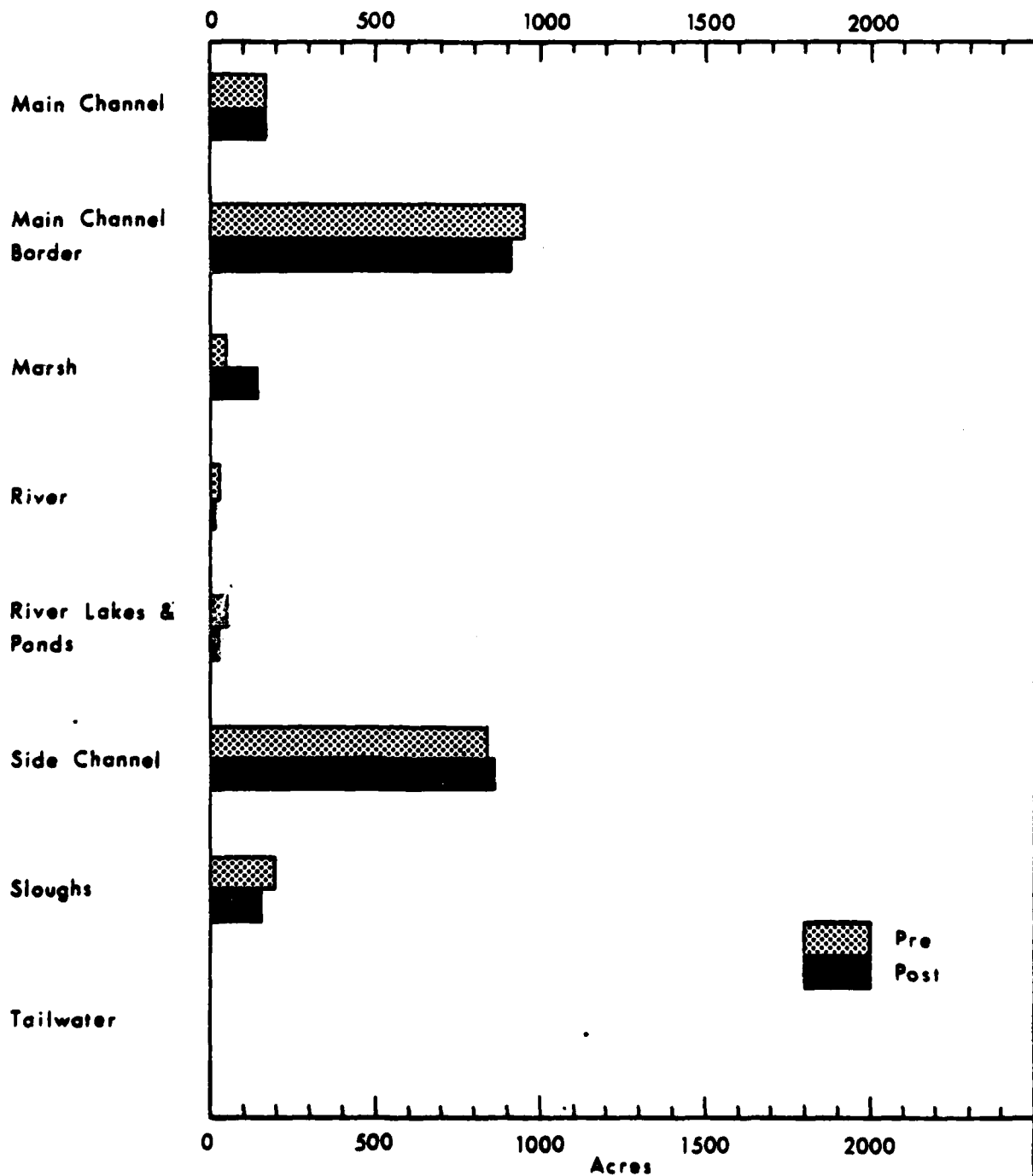


AQUATIC HABITAT

Mississippi River, Pool 25 -- Mile 262 to Mile 267

Pre and Post Impoundment

(1927-1936) & (1975-1977)

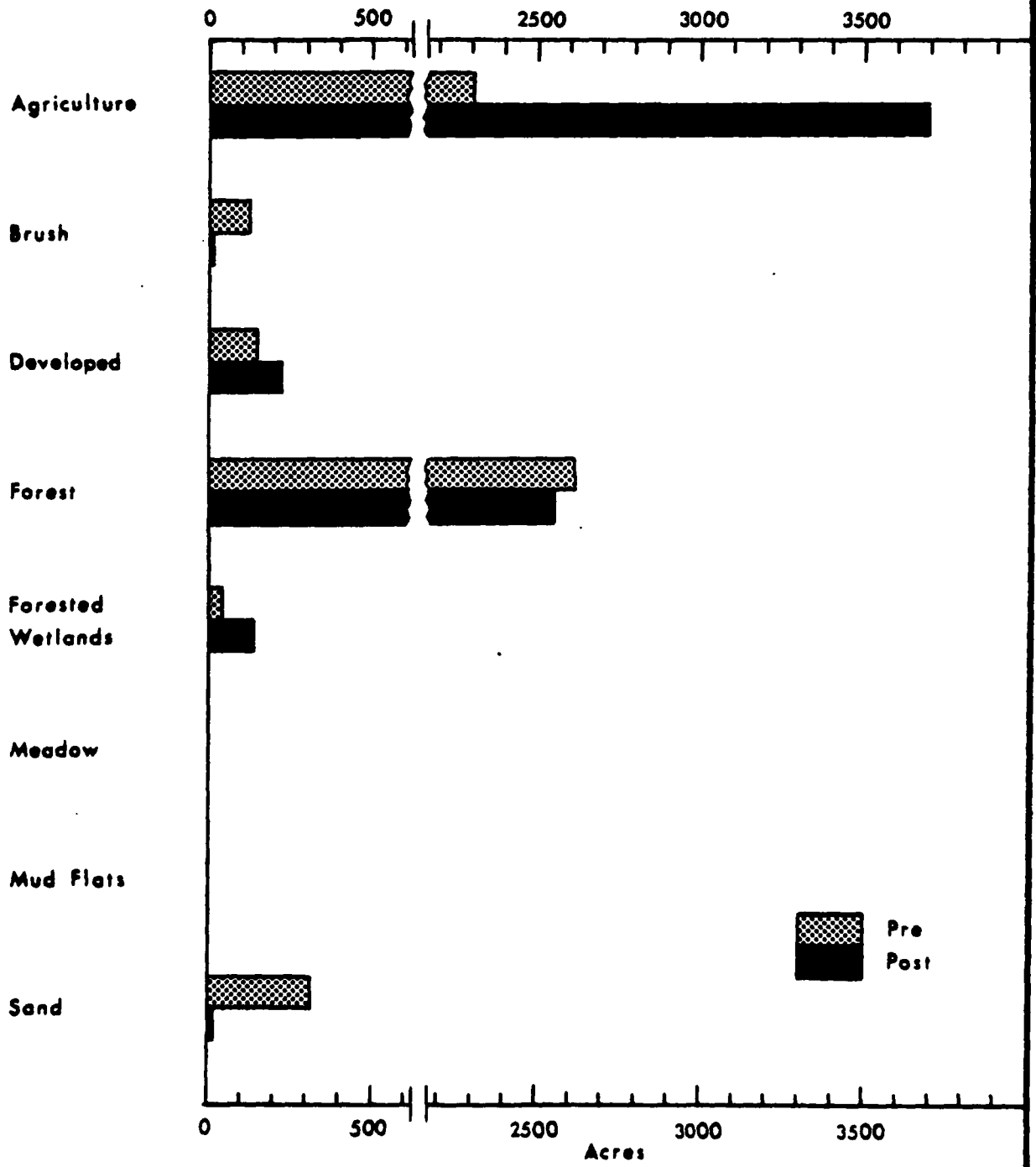


TERRESTRIAL HABITAT

Mississippi River, Pool 25 -- Mile 267 to Mile 273.4

Pre and Post Impoundment

(1927-1936) & (1975-1977)

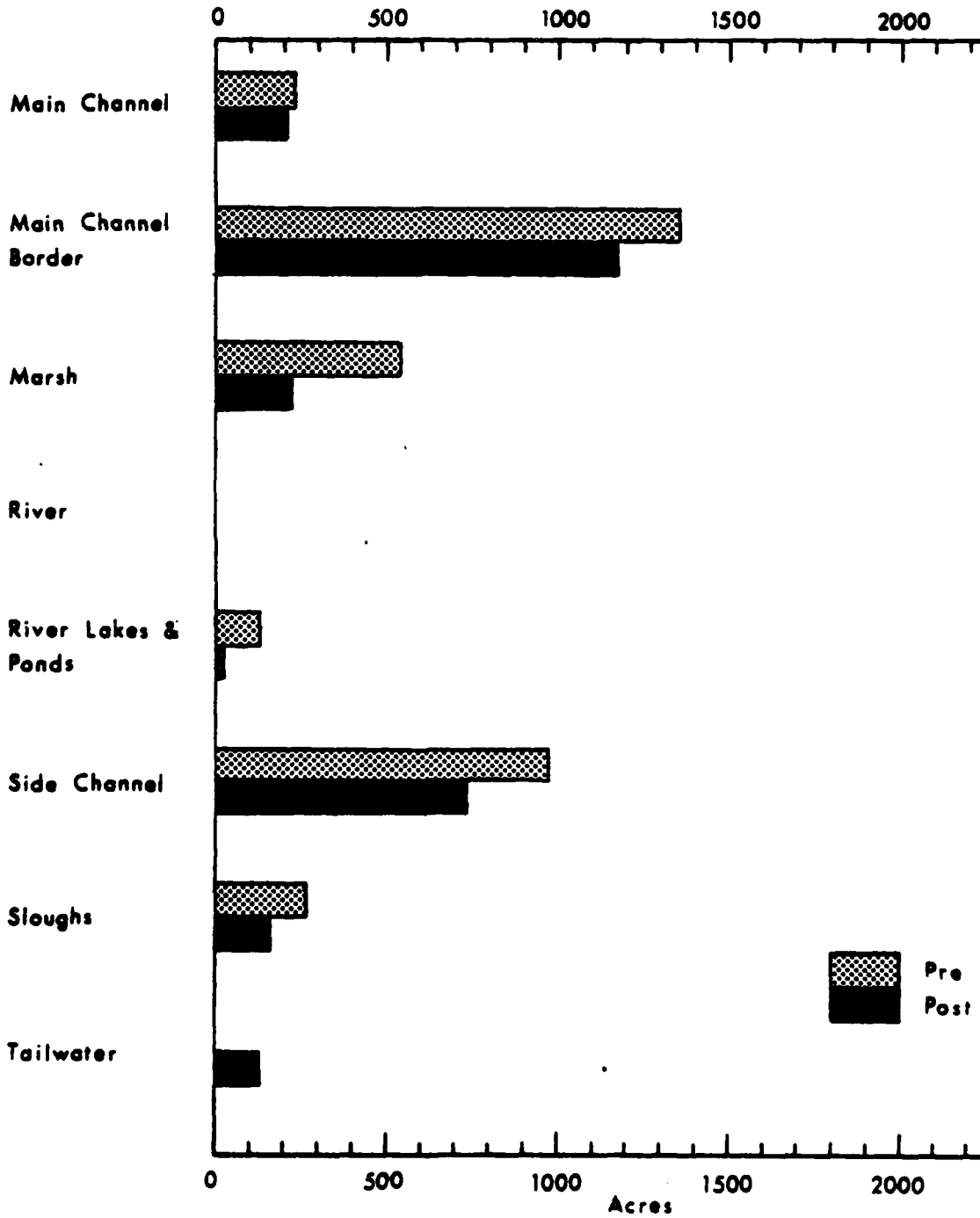


AQUATIC HABITAT

Mississippi River, Pool 25 -- Mile 267 to Mile 273.4

Pre and Post Impoundment

(1927-1936) & (1975-1977)



UPPER MISSISSIPPI RIVER, POOL 26

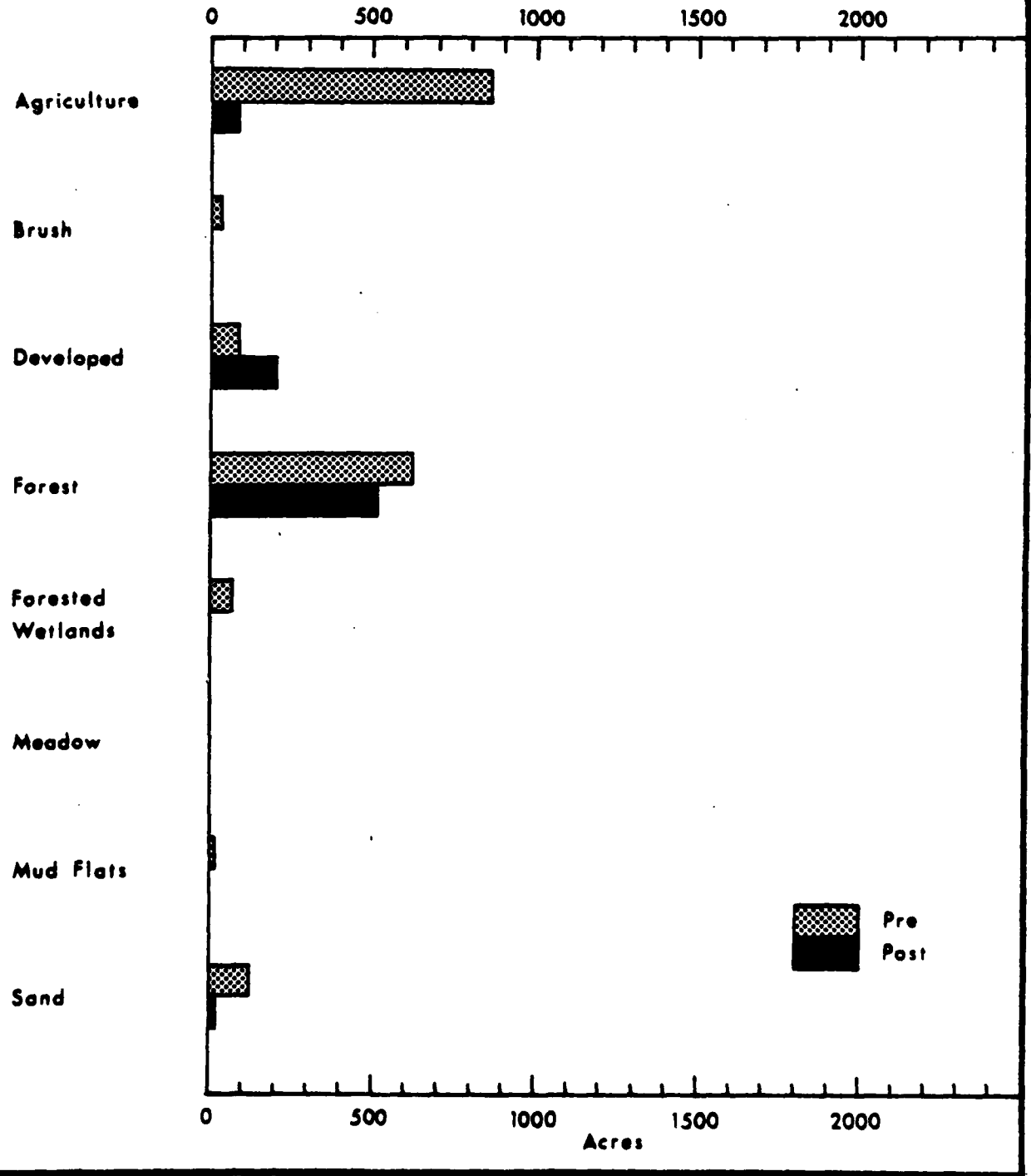
Graphs by 5 mile Sections

TERRESTRIAL HABITAT

Mississippi River, Pool 26 -- Mile 202.6 to Mile 208

Pre and Post Impoundment

(1927 - 1936) & (1975 - 1977)

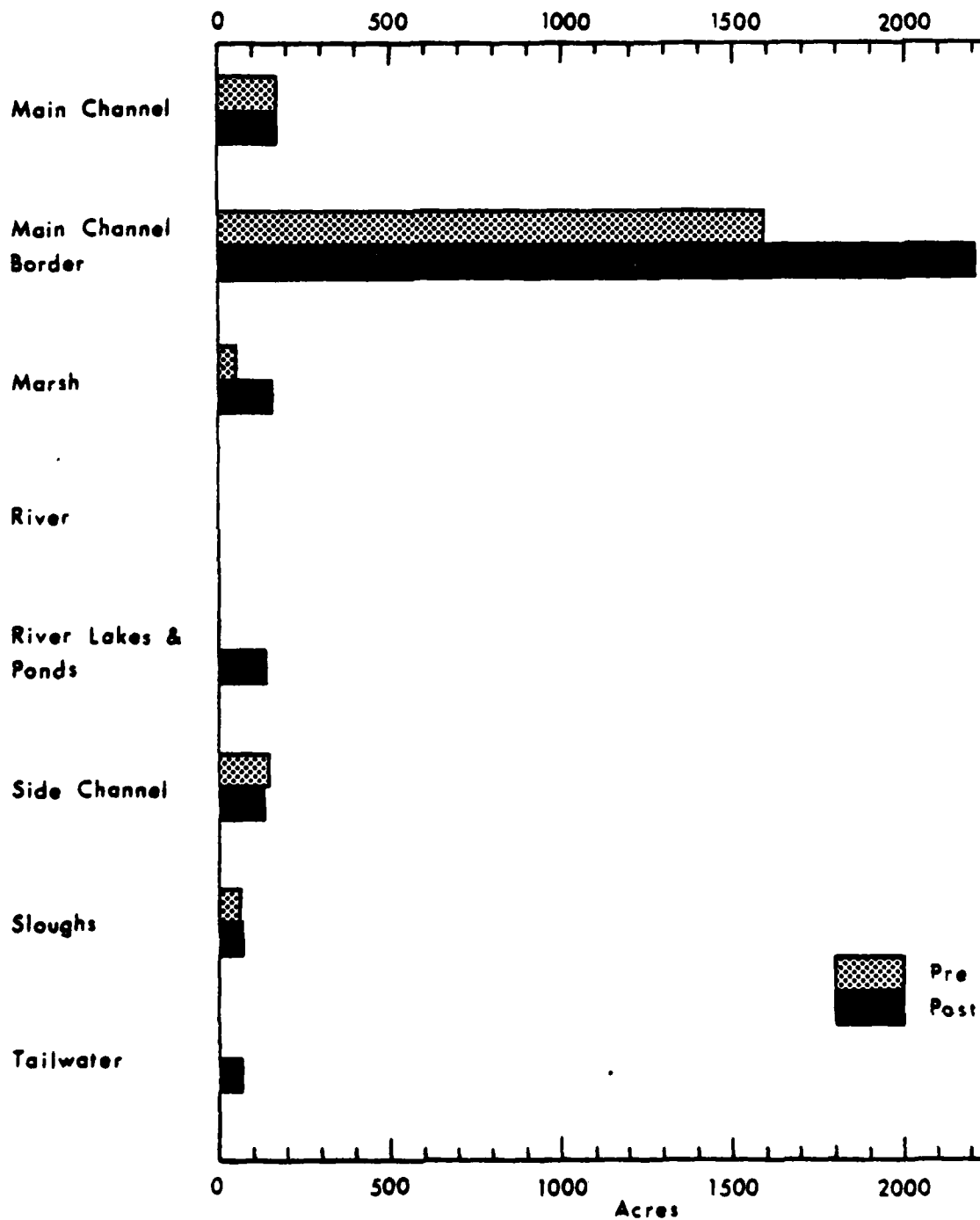


AQUATIC HABITAT

Mississippi River, Pool 26 -- Mile 202.6 to Mile 208

Pre and Post Impoundment

(1927-1936) & (1975-1977)

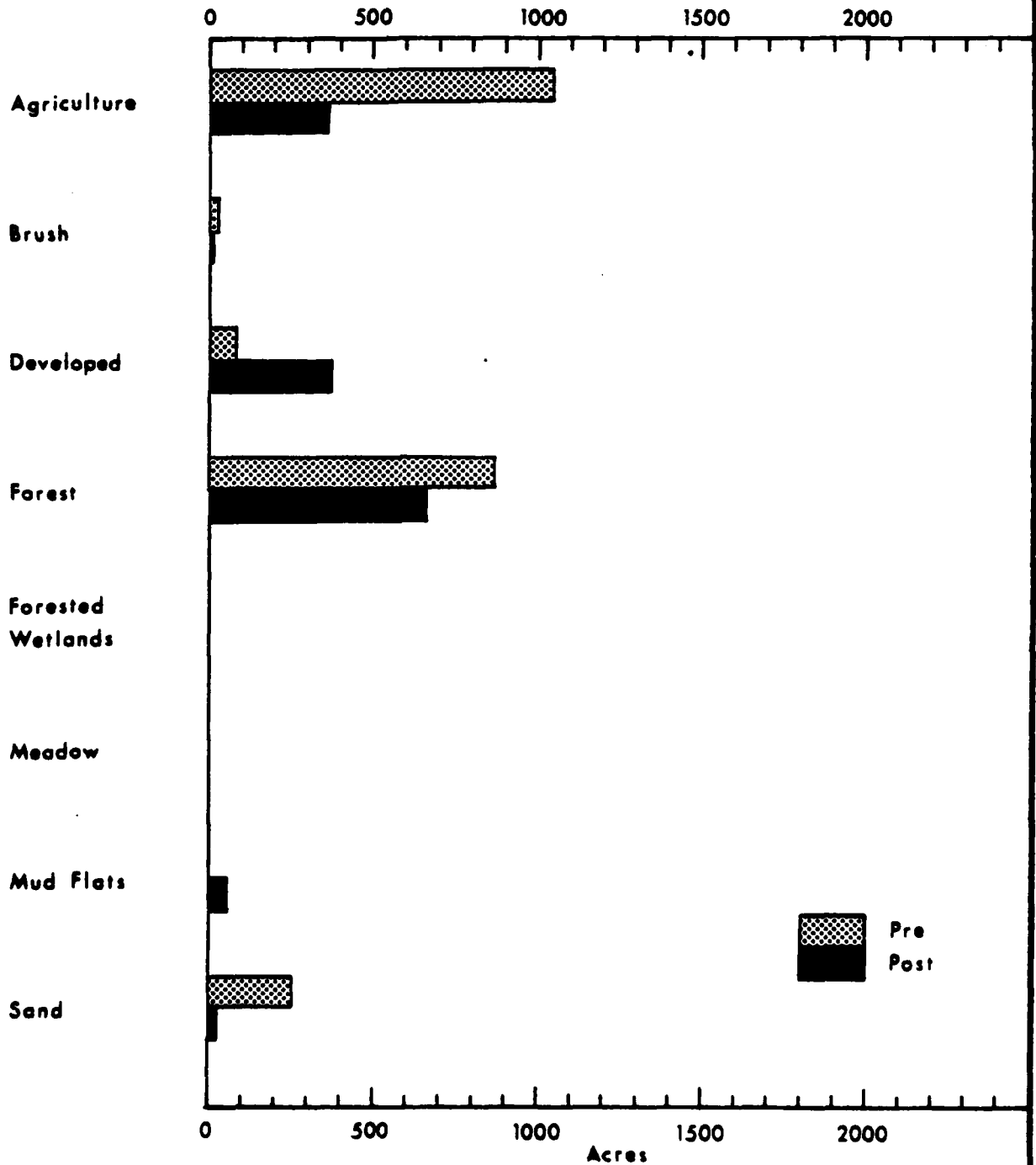


TERRESTRIAL HABITAT

Mississippi River, Pool 26 -- Mile 208 to Mile 213

Pre and Post Impoundment

(1927-1936) & (1975-1977)

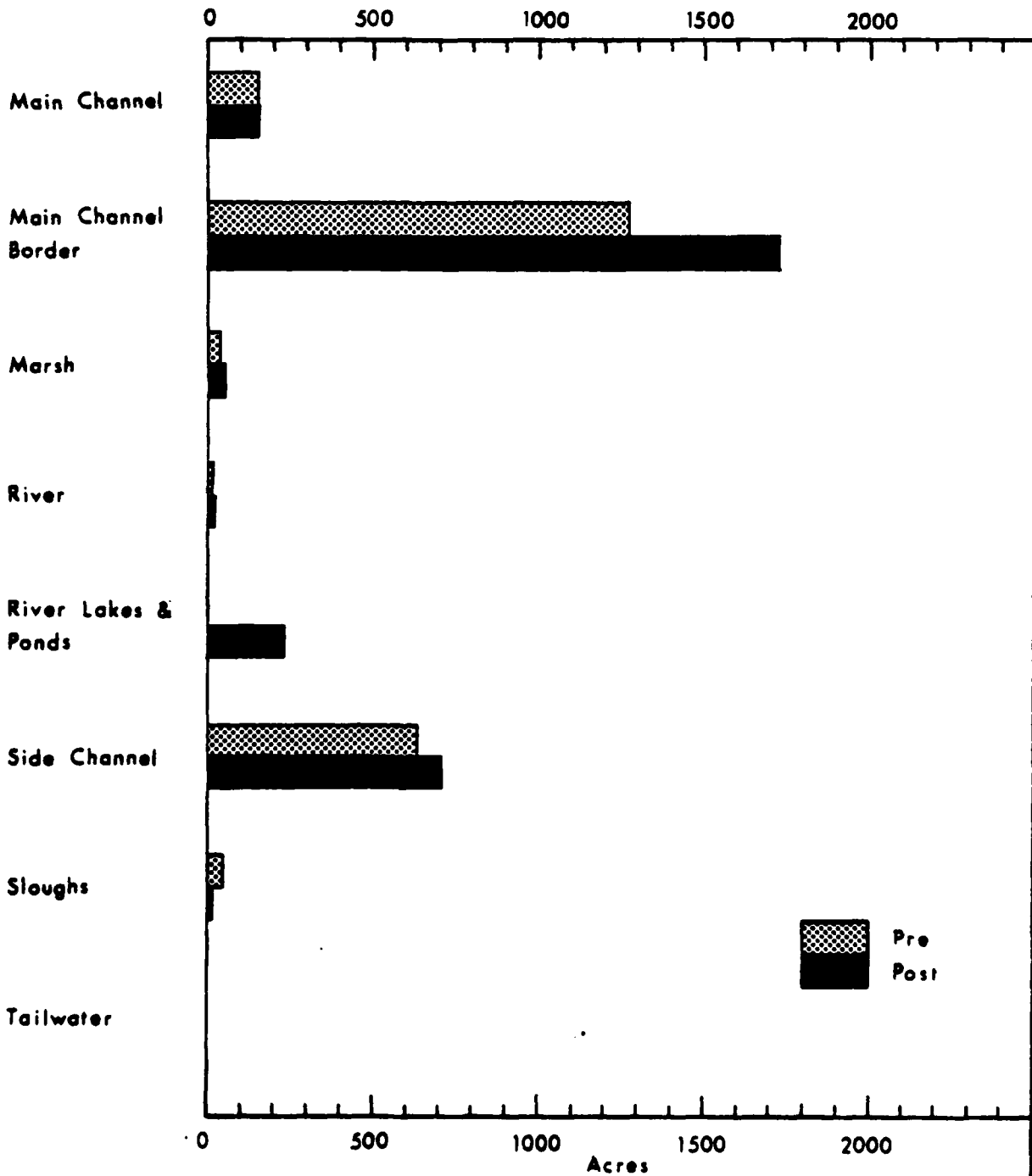


AQUATIC HABITAT

Mississippi River, Pool 26 -- Mile 208 to Mile 213

Pre and Post Impoundment

(1927-1936) & (1975-1977)

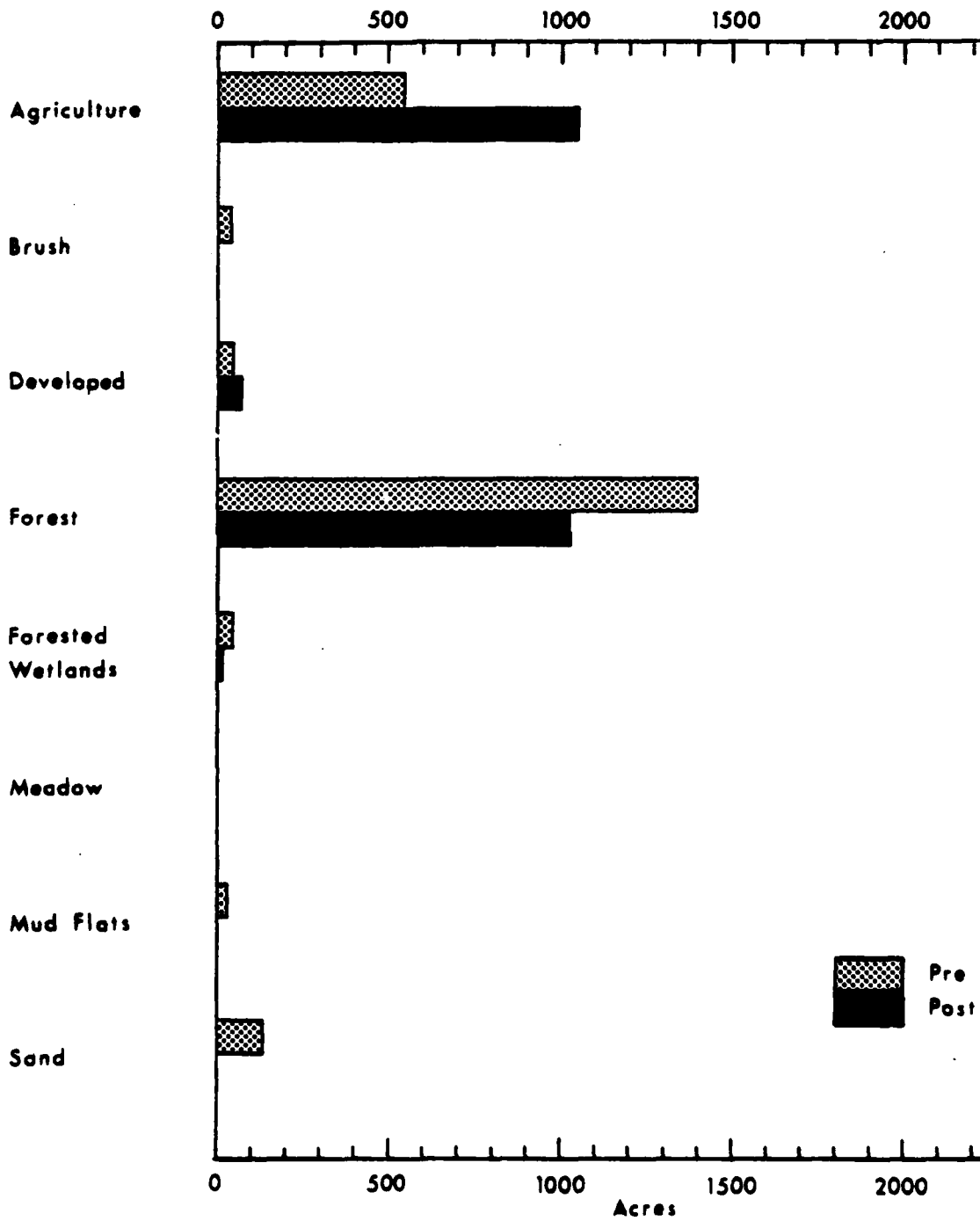


TERRESTRIAL HABITAT

Mississippi River, Pool 26 -- Mile 213 to Mile 218

Pre and Post Impoundment

(1927-1936) & (1975-1977)

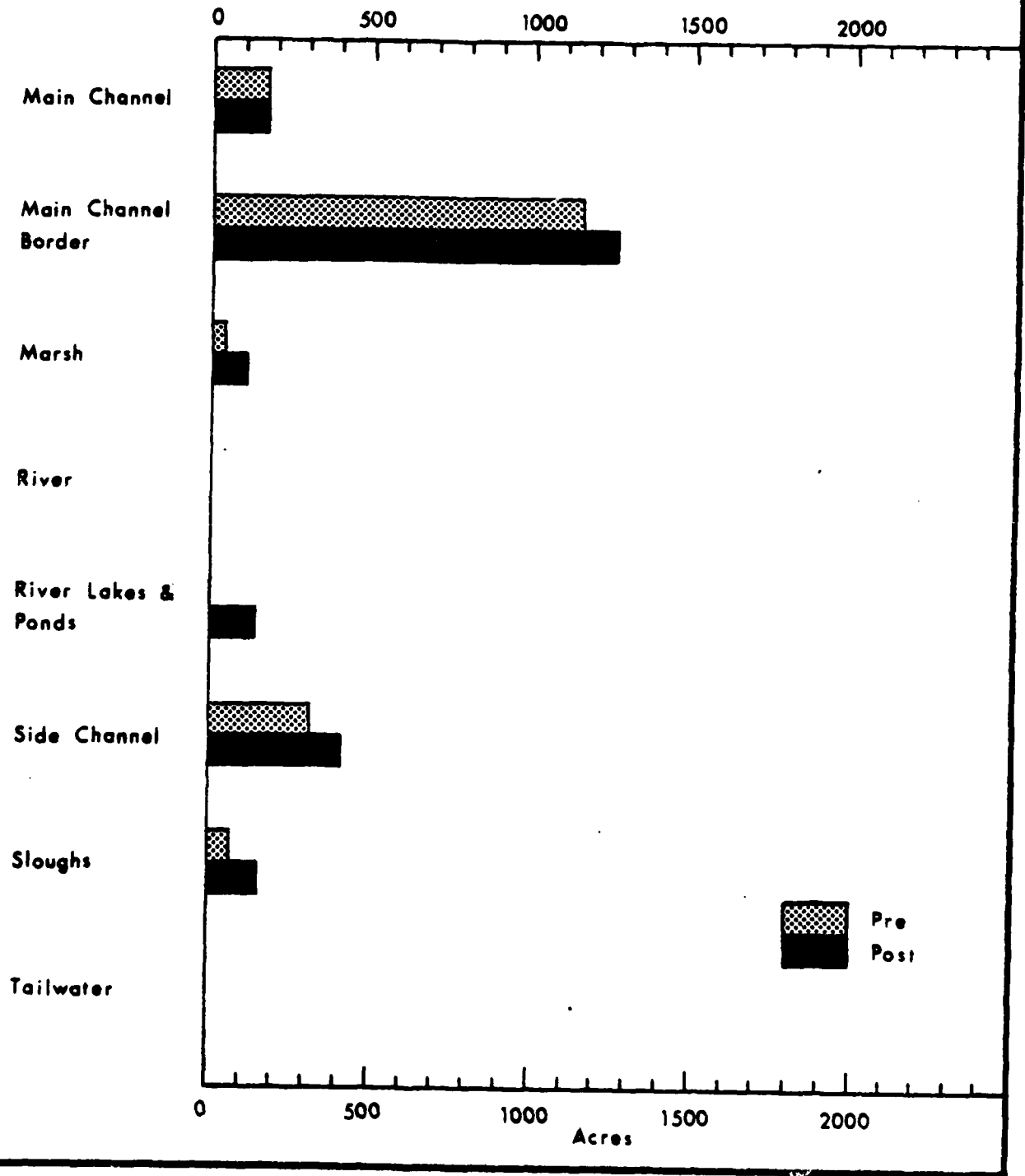


AQUATIC HABITAT

Mississippi River, Pool 26 -- Mile 213 to Mile 218

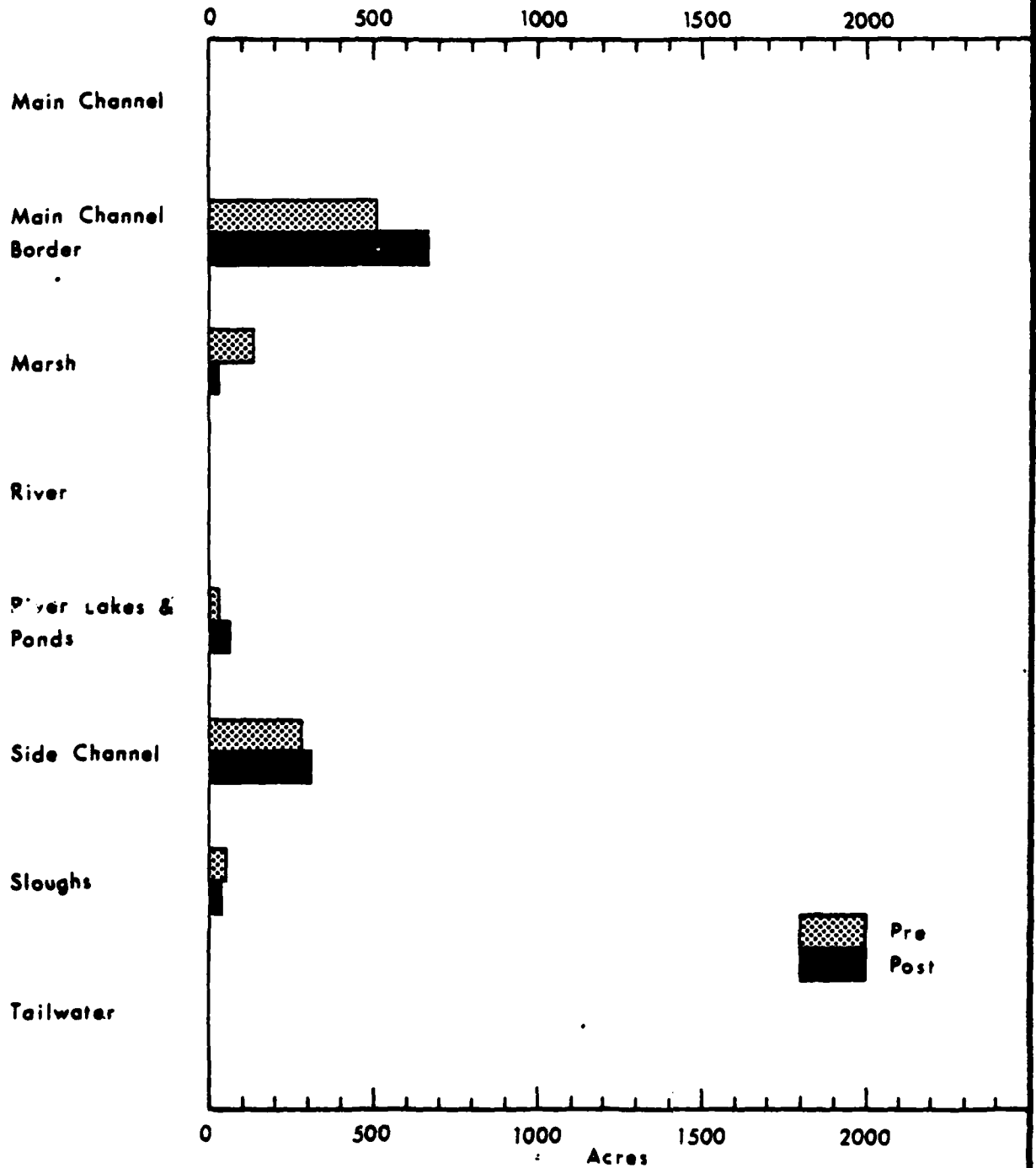
Pre and Post Impoundment

(1927-1936) & (1975-1977)



AQUATIC HABITAT

Mississippi River, Pool 26 -- Mile 218 to Mile 223 RIGHT
Pre and Post Impoundment
(1927 - 1936) & (1975 - 1977)

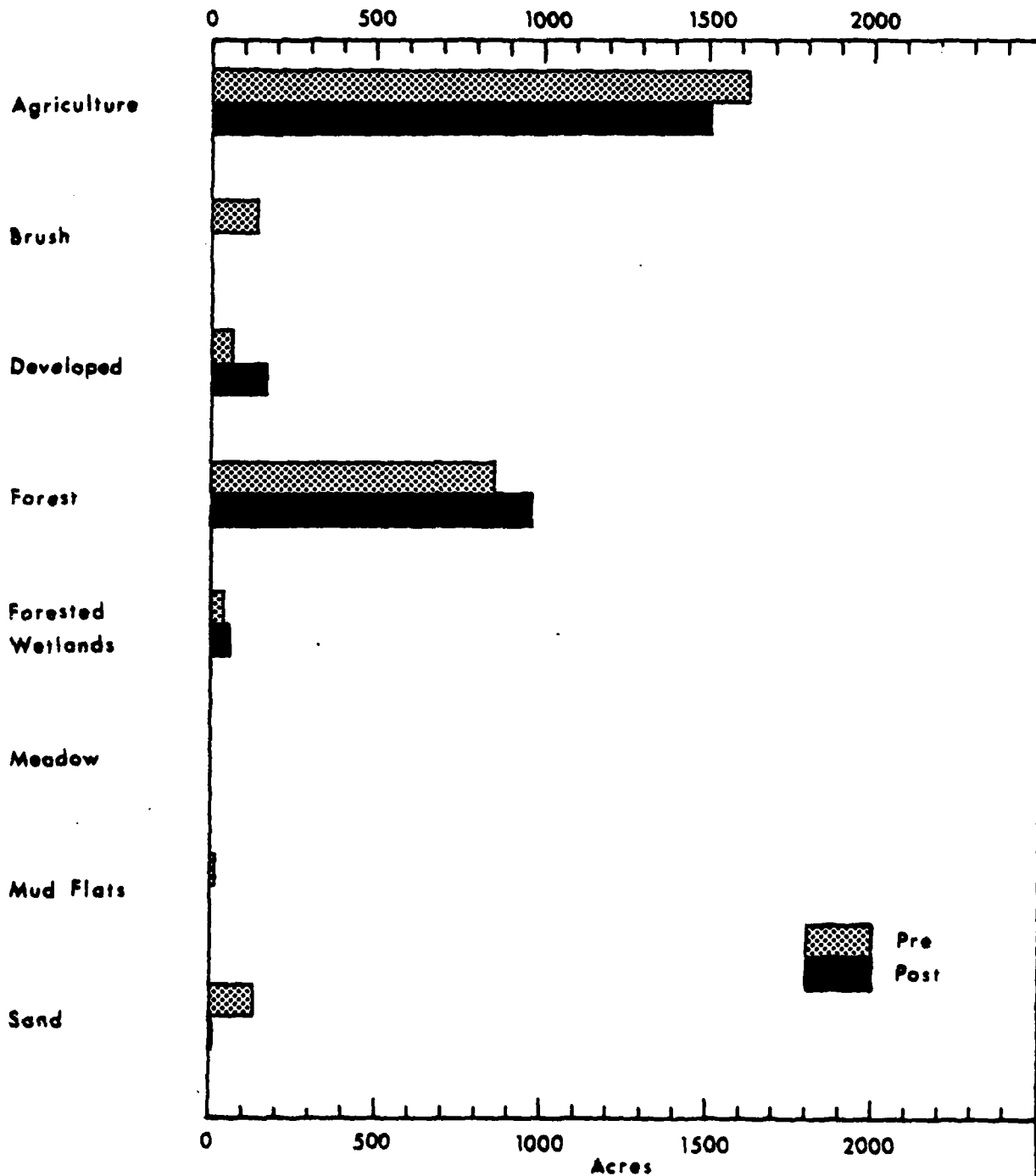


TERRESTRIAL HABITAT

Mississippi River, Pool 26 -- Mile 218 to Mile 223 RIGHT

Pre and Post Impoundment

(1927-1936) & (1975-1977)

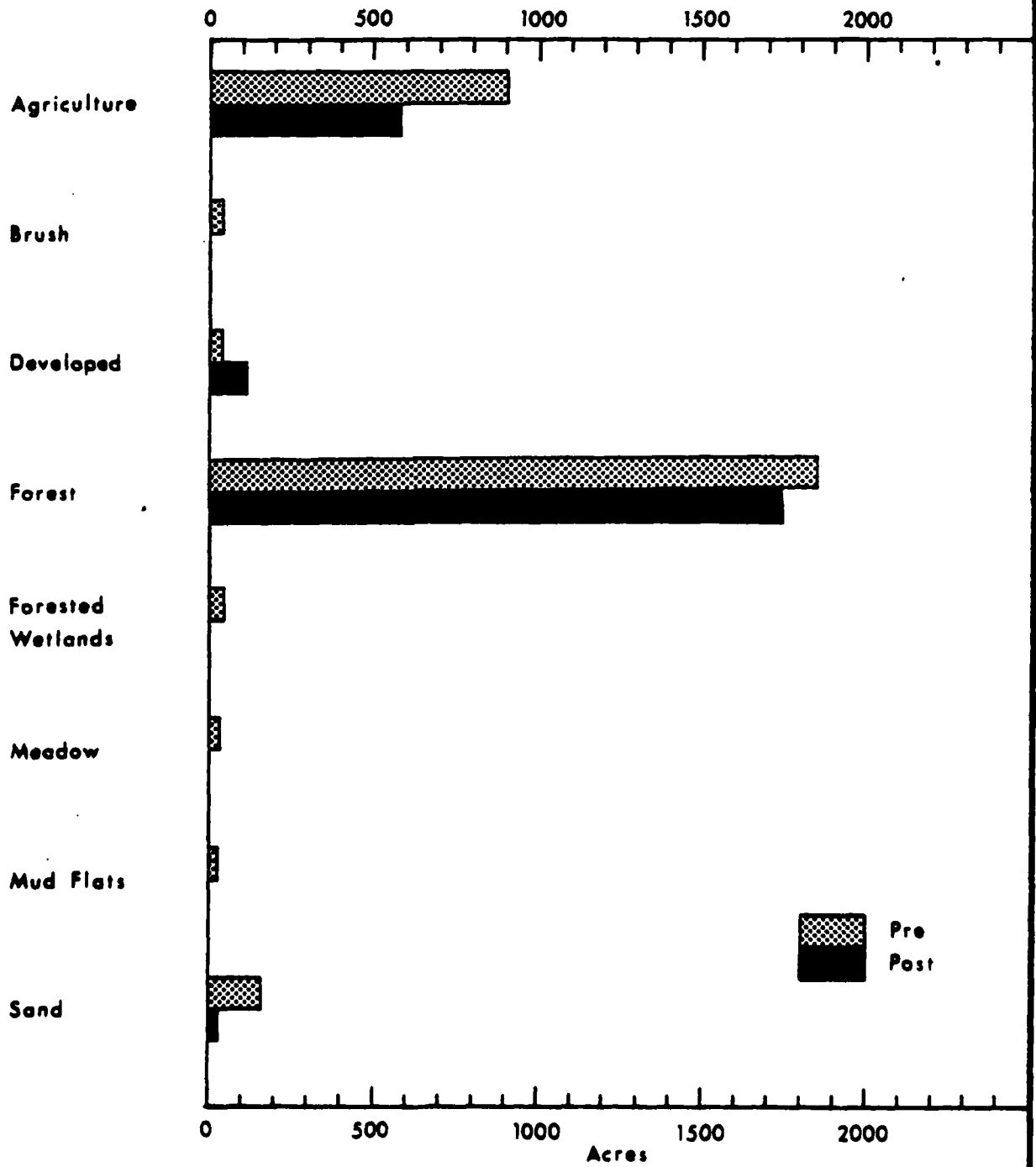


TERRESTRIAL HABITAT

Mississippi River, Pool 26 -- Mile 218 to Mile 223, Calhoun Pt.

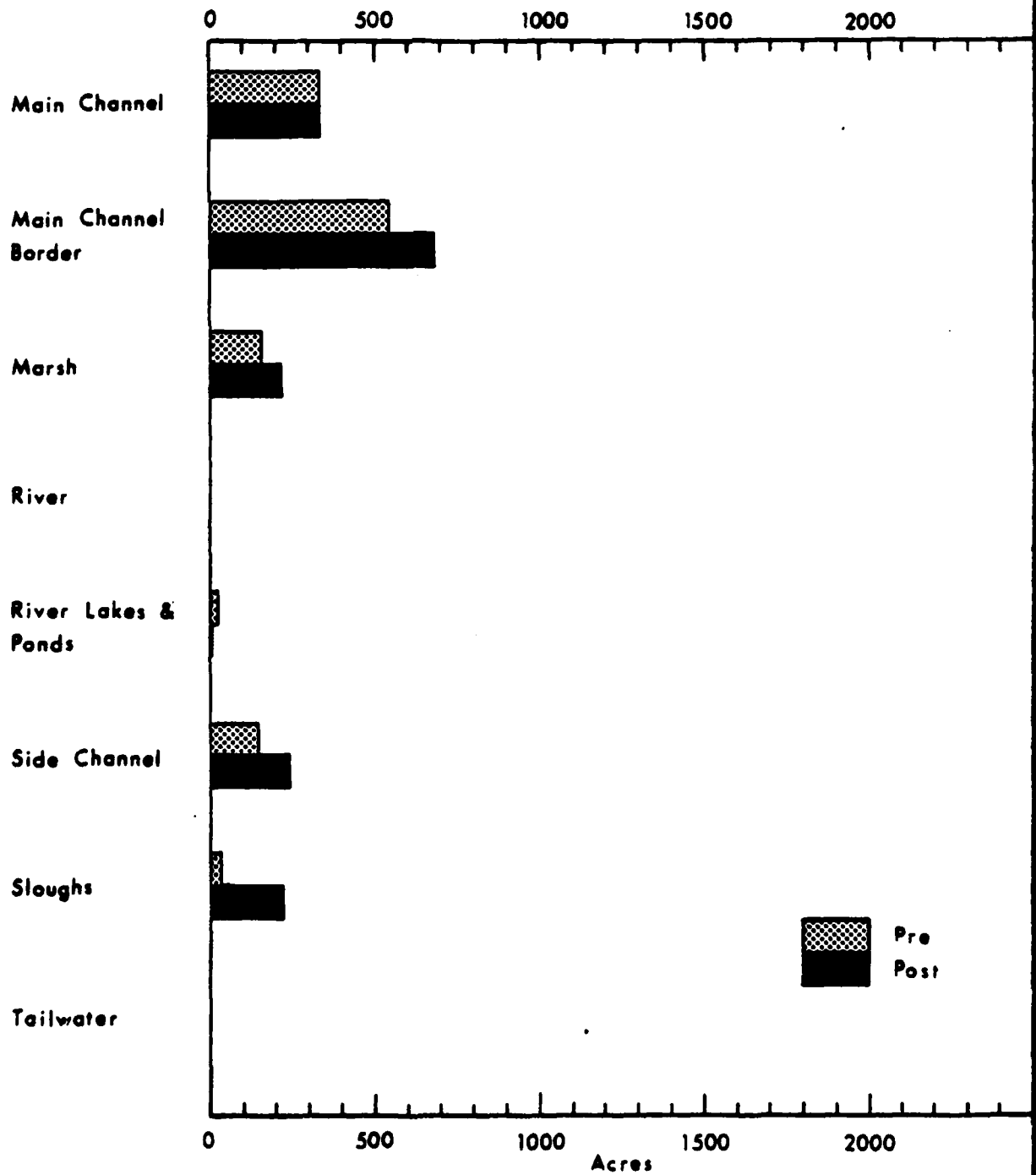
Pre and Post Impoundment

(1927-1936) & (1975-1977)



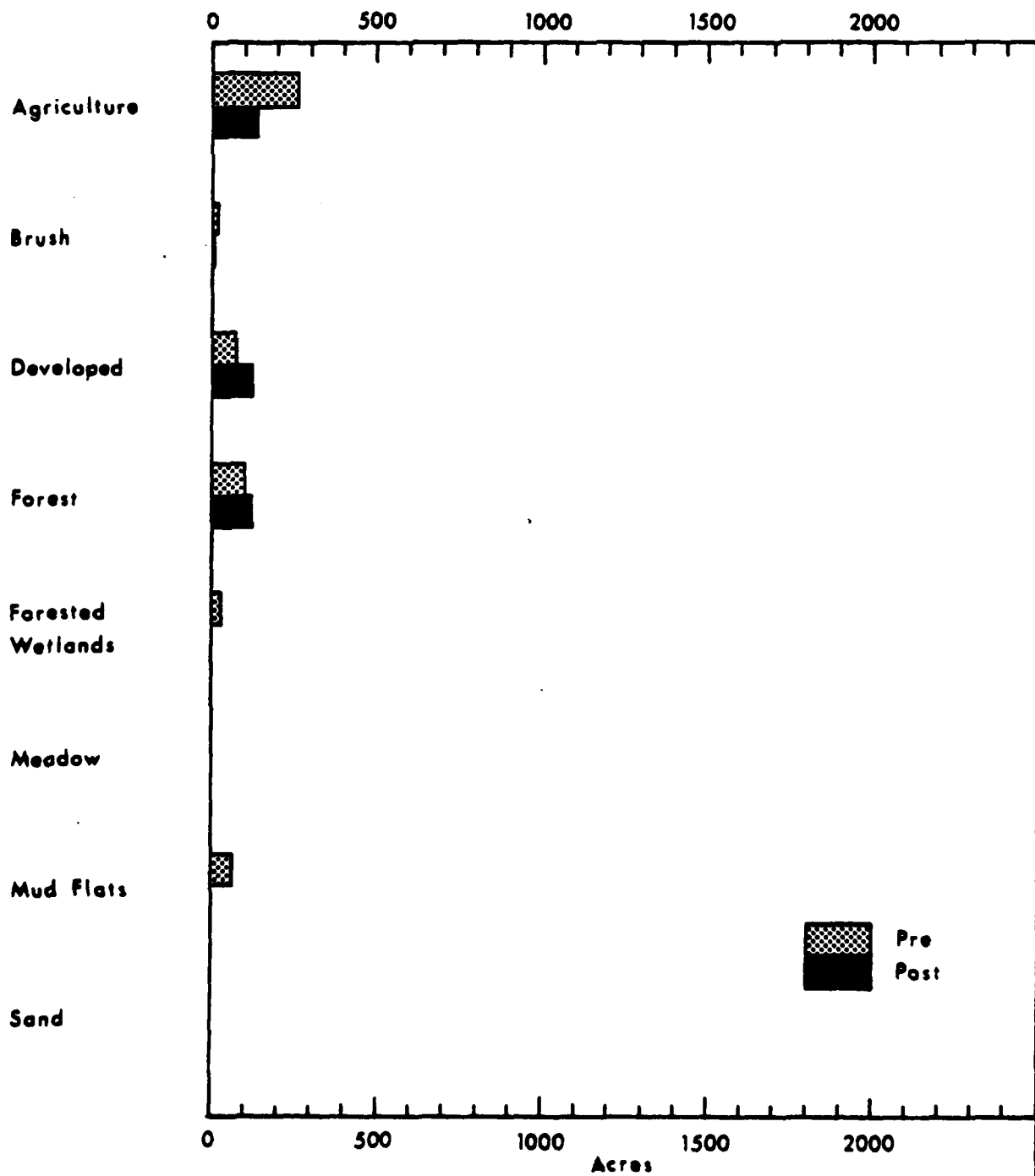
AQUATIC HABITAT

Mississippi River, Pool 26 -- Mile 218 to Mile 223, Calhoun Pt.
Pre and Post Impoundment
(1927-1936) & (1975-1977)



TERRESTRIAL HABITAT

Illinois River, Pool 26 -- Mile 0 to Mile 5 LEFT
Pre and Post Impoundment
(1927-1936) & (1975-1977)

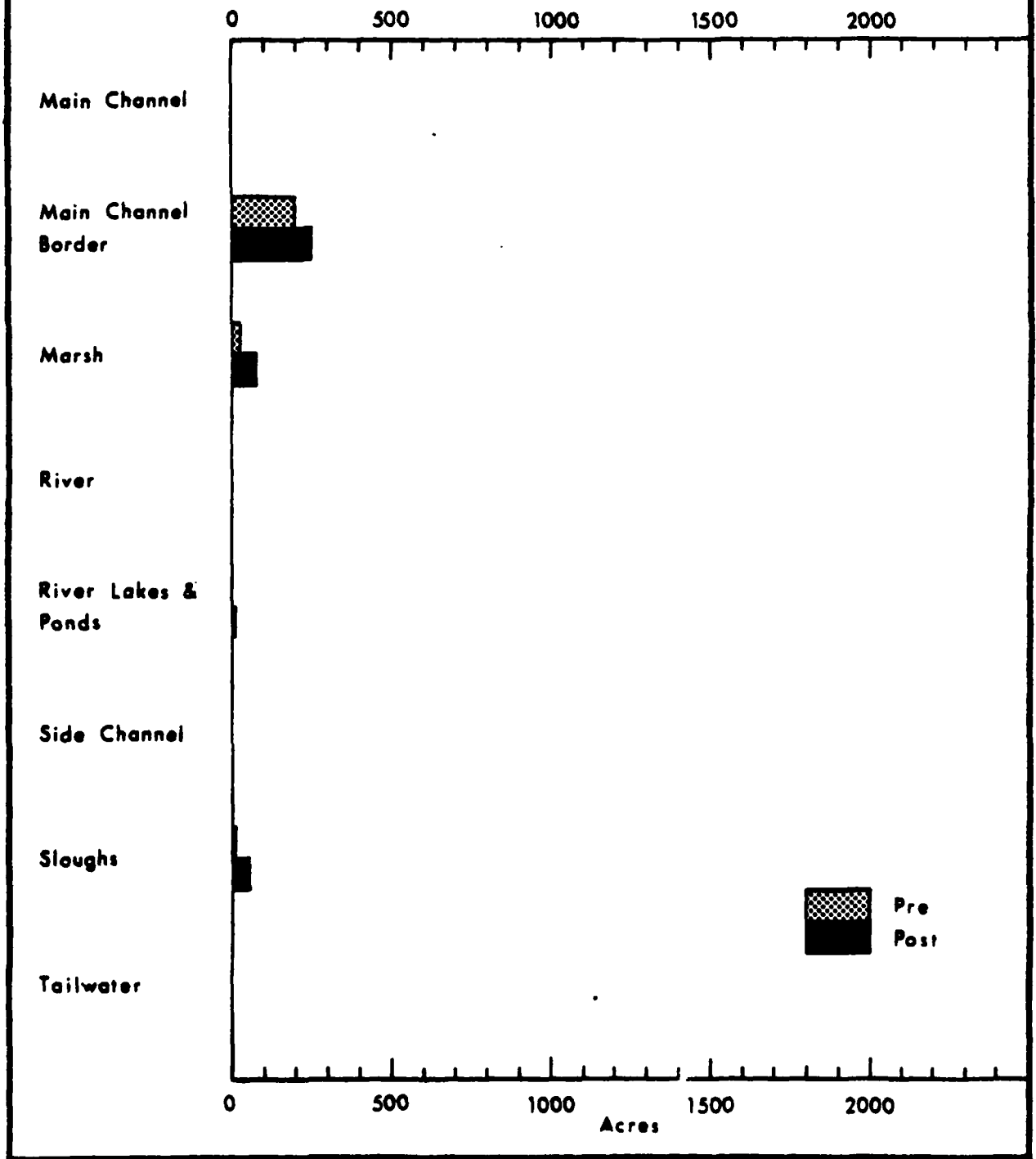


AQUATIC HABITAT

Illinois River, Pool 26 -- Mile 0 to Mile 5 LEFT

Pre and Post Impoundment

(1927-1936) & (1975-1977)

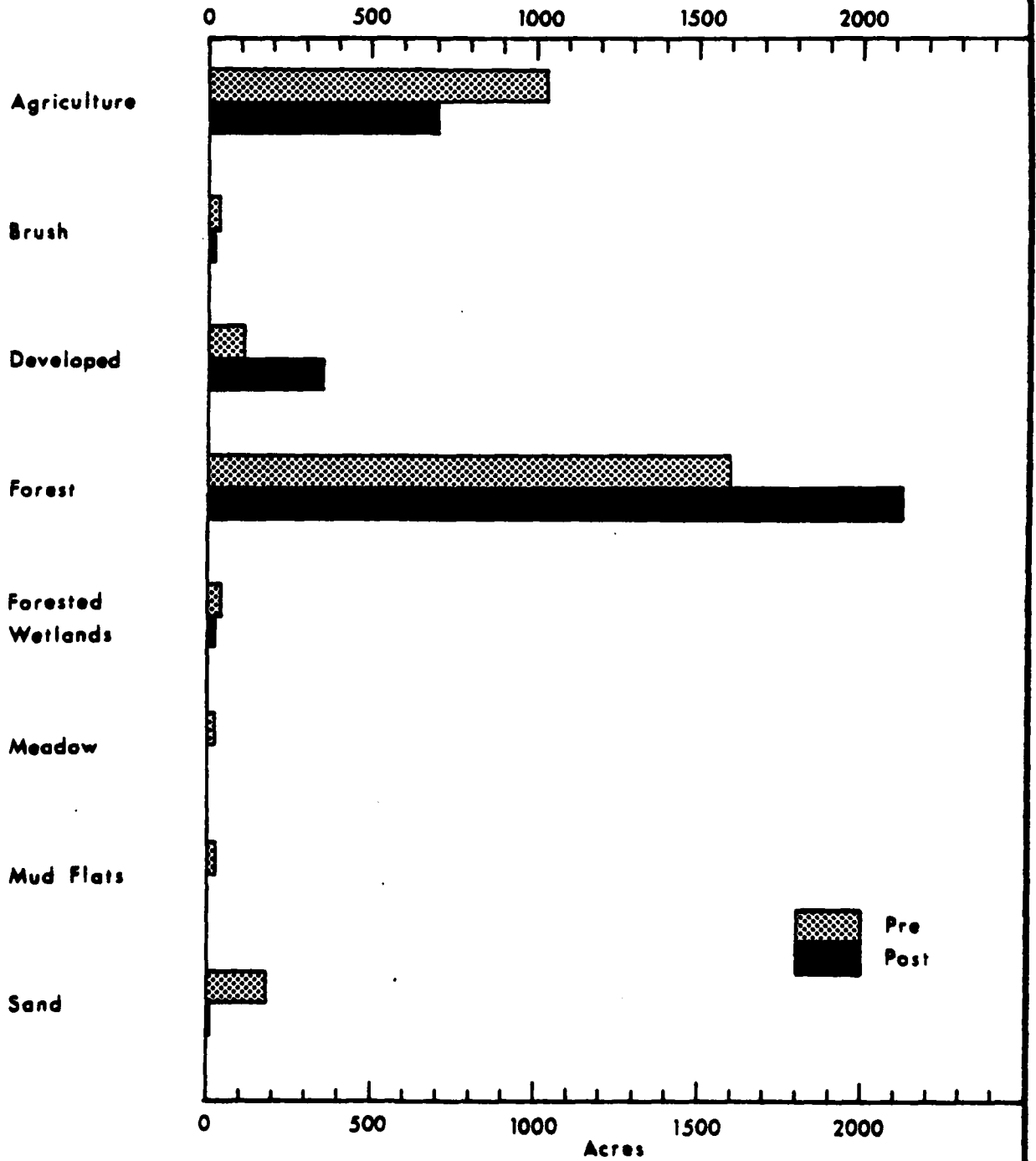


TERRESTRIAL HABITAT

Mississippi River, Pool 26 -- Mile 223 to Mile 228

Pre and Post Impoundment

(1927-1936) & (1975-1977)

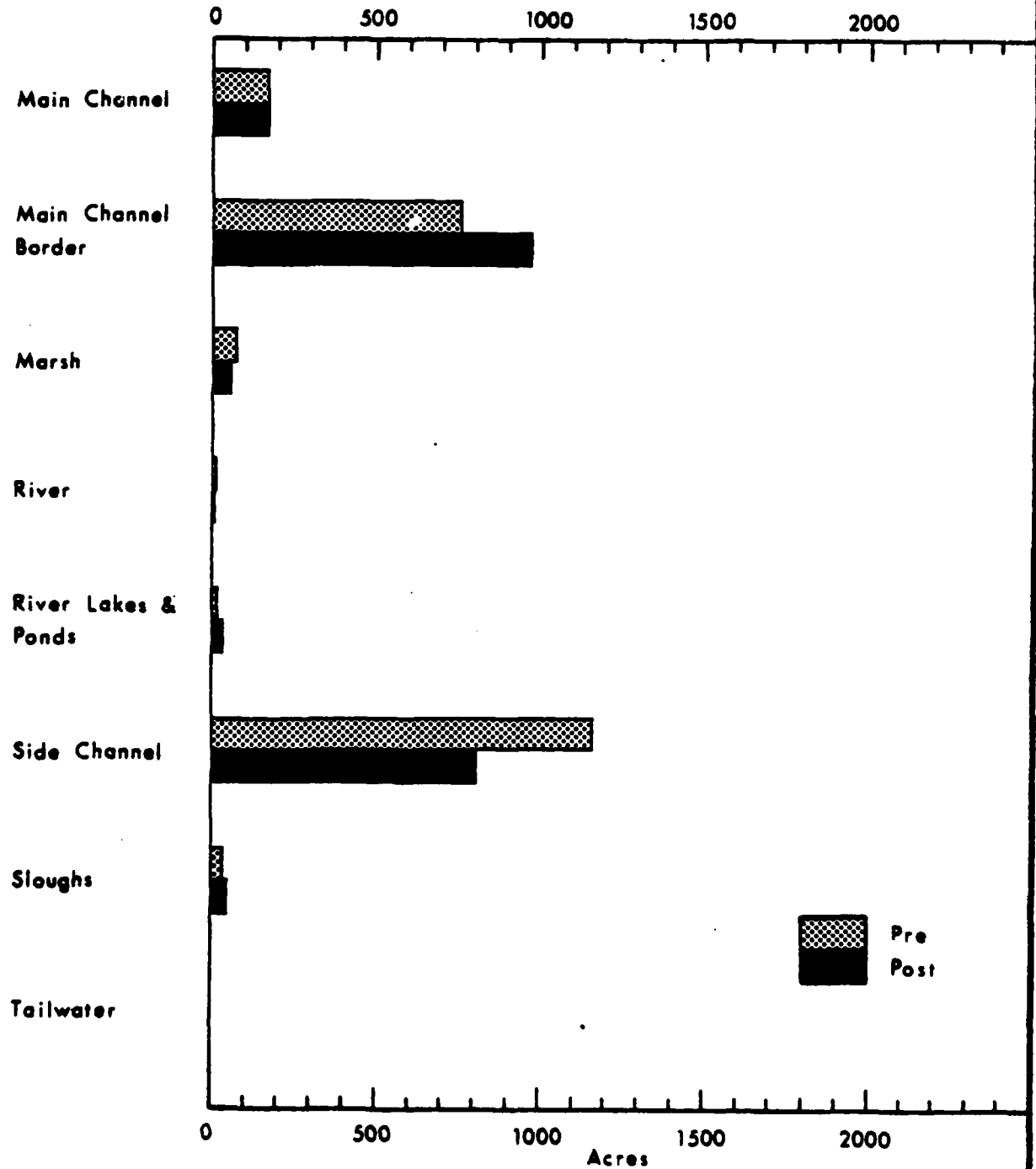


AQUATIC HABITAT

Mississippi River, Pool 26 -- Mile 223 to Mile 228

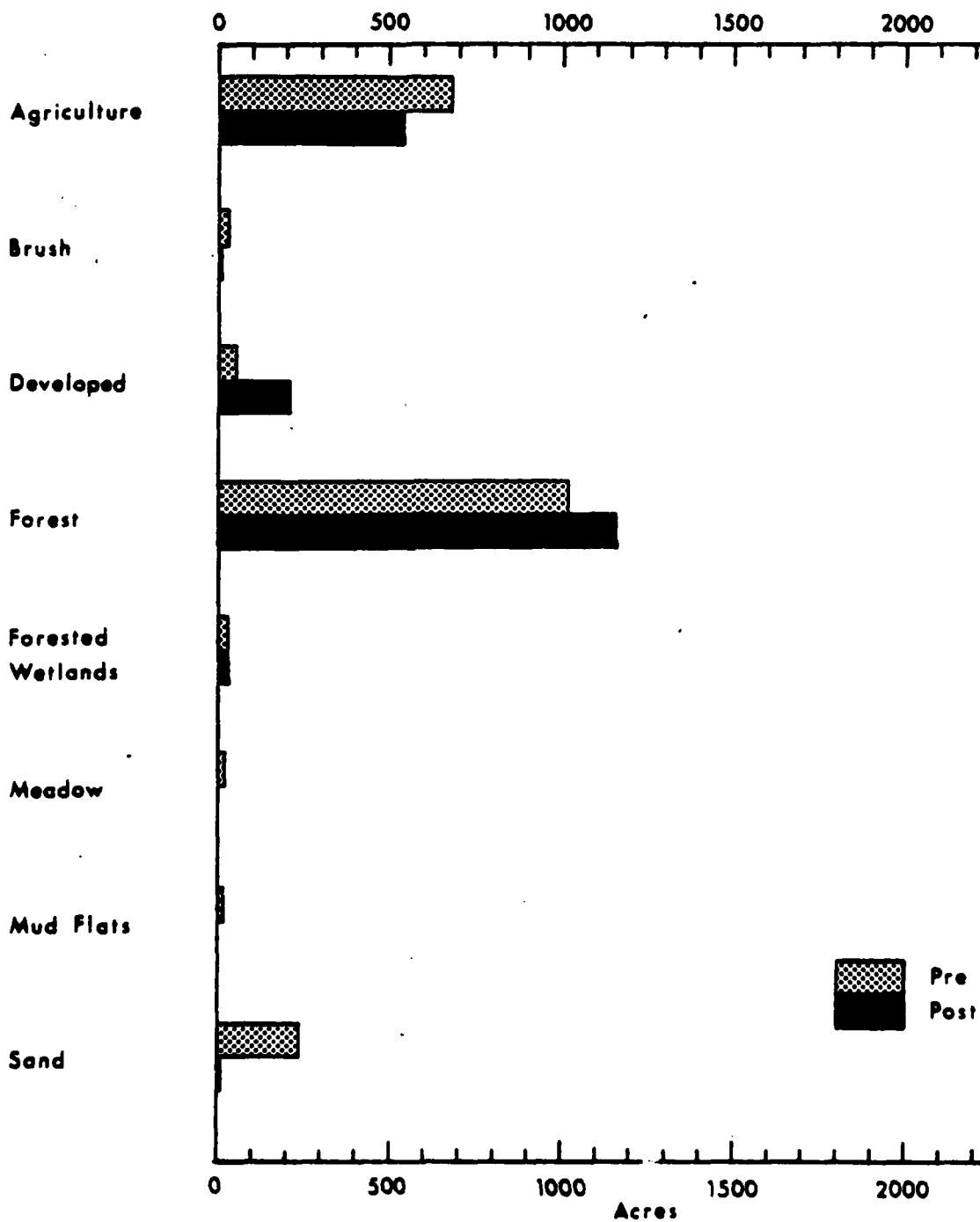
Pre and Post Impoundment

(1927-1936) & (1975-1977)



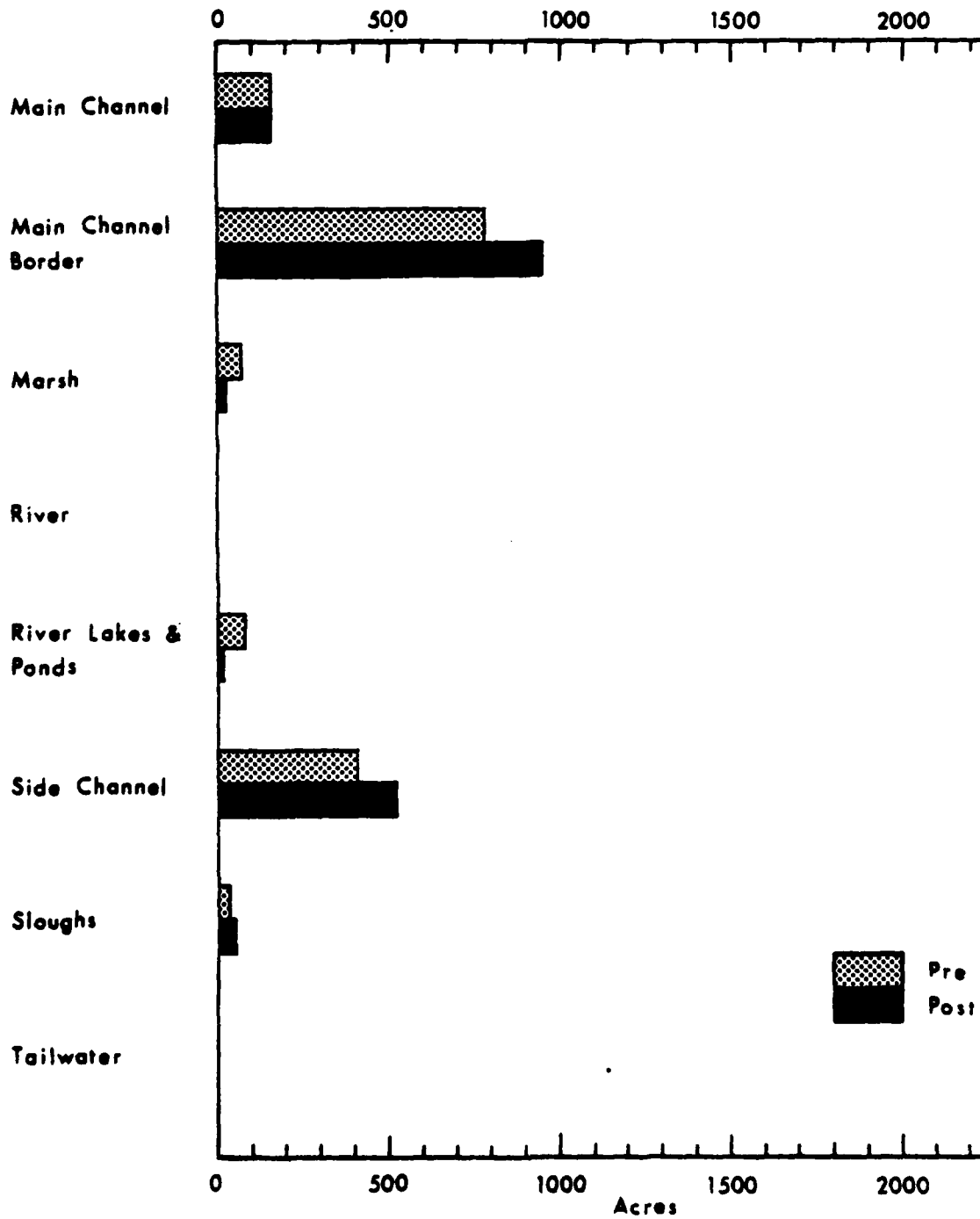
TERRESTRIAL HABITAT

Mississippi River, Pool 26 -- Mile 228 to Mile 233
Pre and Post Impoundment
(1927 - 1936) & (1975 - 1977)



AQUATIC HABITAT

Mississippi River, Pool 26 -- Mile 228 to Mile 233
Pre and Post Impoundment
(1927-1936) & (1975-1977)

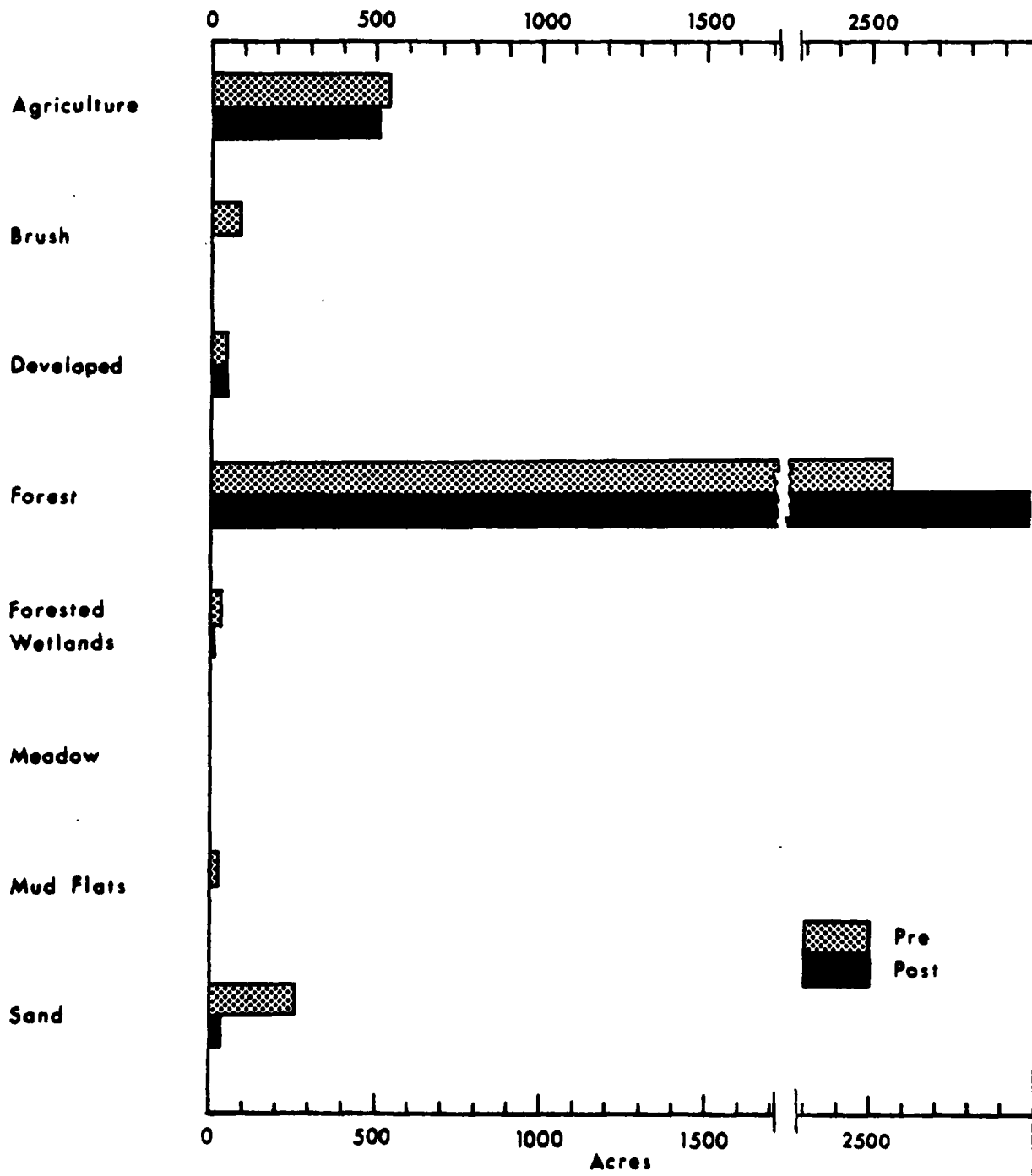


TERRESTRIAL HABITAT

Mississippi River, Pool 26 -- Mile 233 to Mile 238

Pre and Post Impoundment

(1927-1936) & (1975-1977)

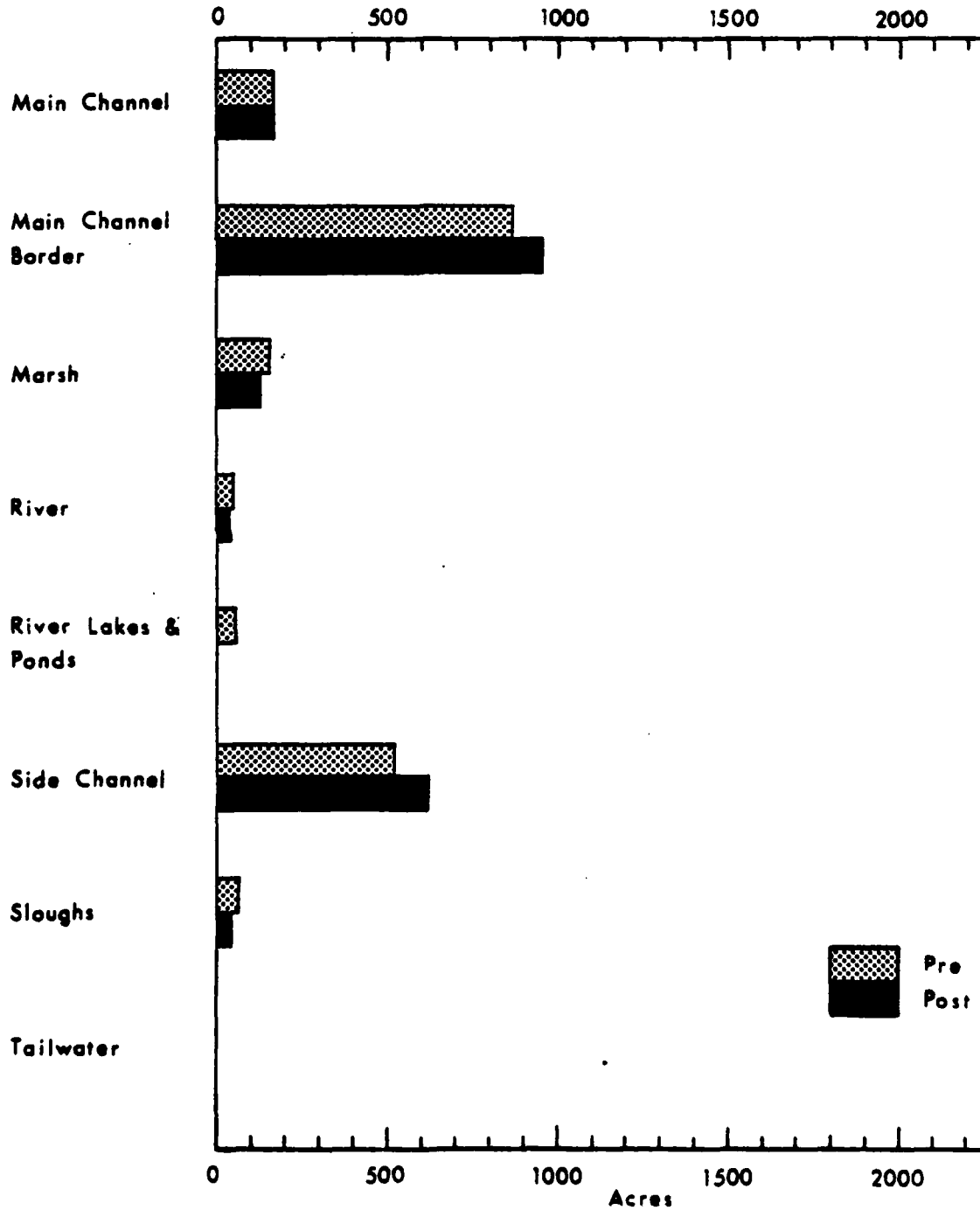


AQUATIC HABITAT

Mississippi River, Pool 26 -- Mile 233 to Mile 238

Pre and Post Impoundment

(1927-1936) & (1975-1977)

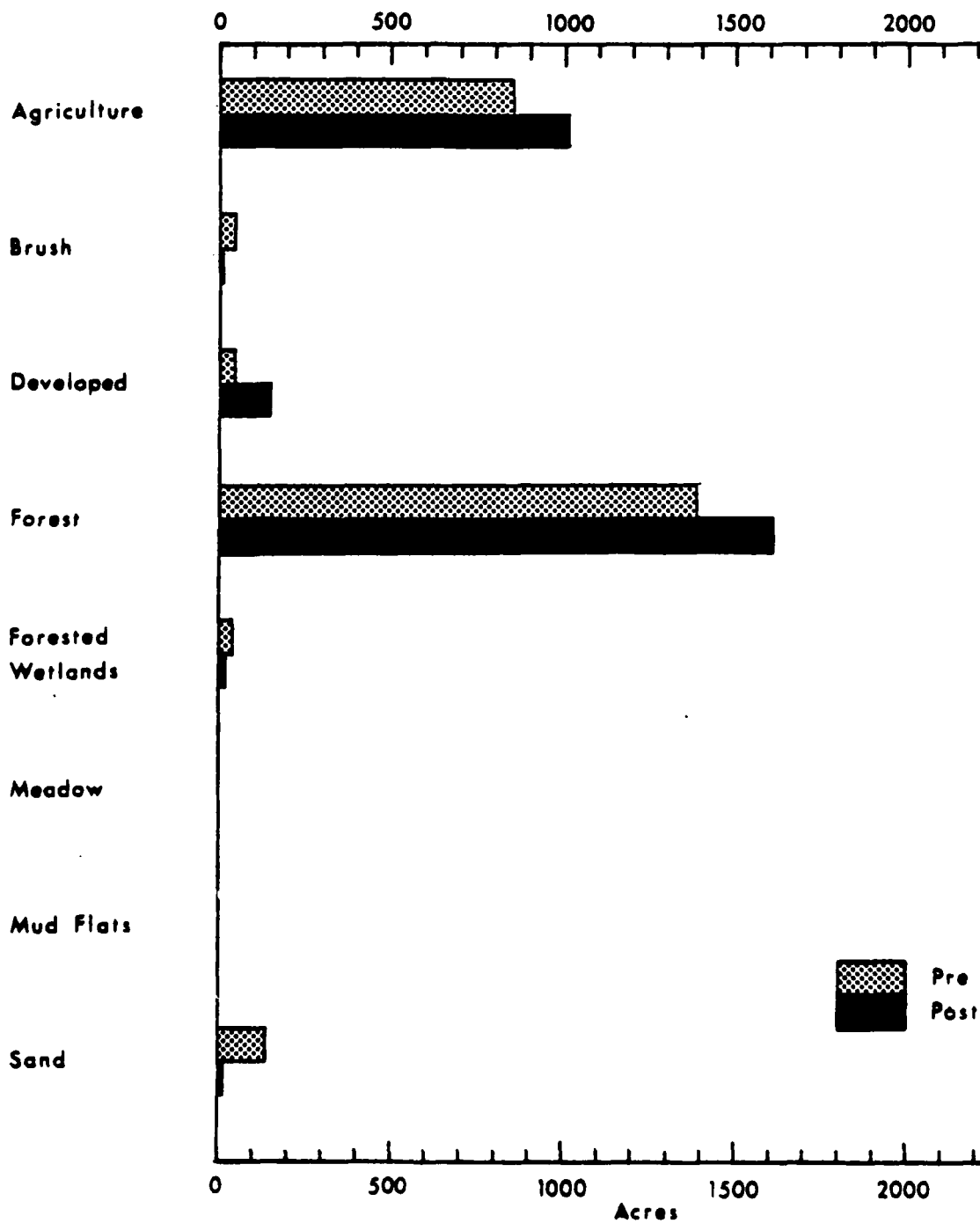


TERRESTRIAL HABITAT

Mississippi River, Pool 26 -- Mile 238 to Mile 241.5

Pre and Post Impoundment

(1927-1936) & (1975-1977)



AD-A124 636

TERRESTRIAL AND AQUATIC LAND USE AND HABITAT CHANGE AS
A RESULT OF THE NI. (U) ARMY ENGINEER DISTRICT ST LOUIS
NO MAR 80

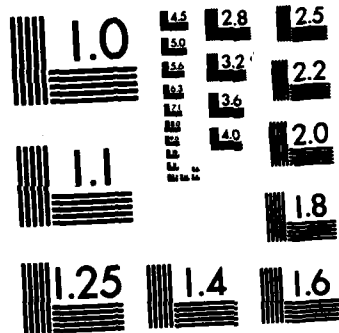
2/2

UNCLASSIFIED

F/G 13/2

NL

						END							
						FILED							
						ETC							



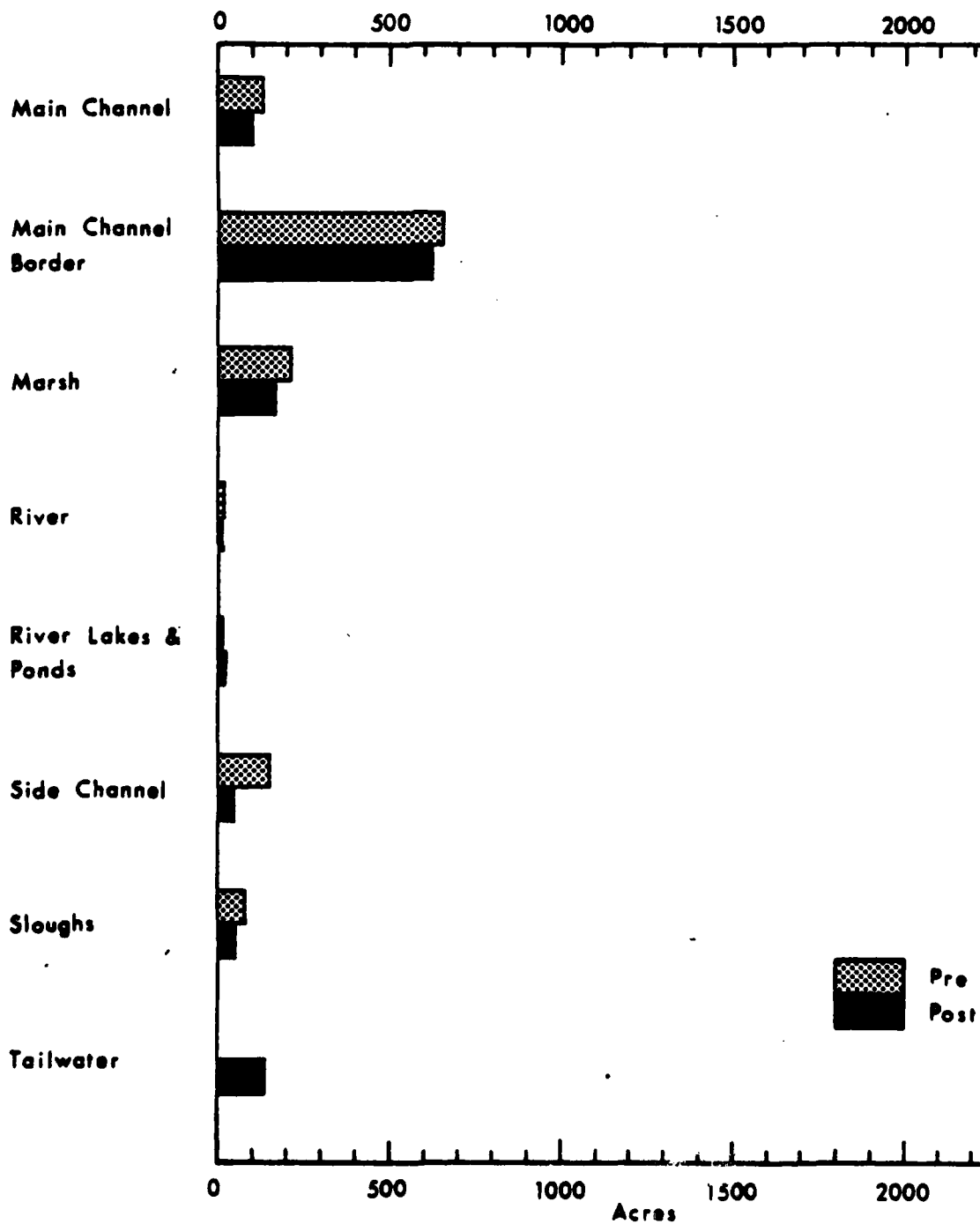
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

AQUATIC HABITAT

Mississippi River, Pool 26 -- Mile 238 to Mile 241.5

Pre and Post Impoundment

(1927-1936) & (1975-1977)



LOWER ILLINOIS RIVER

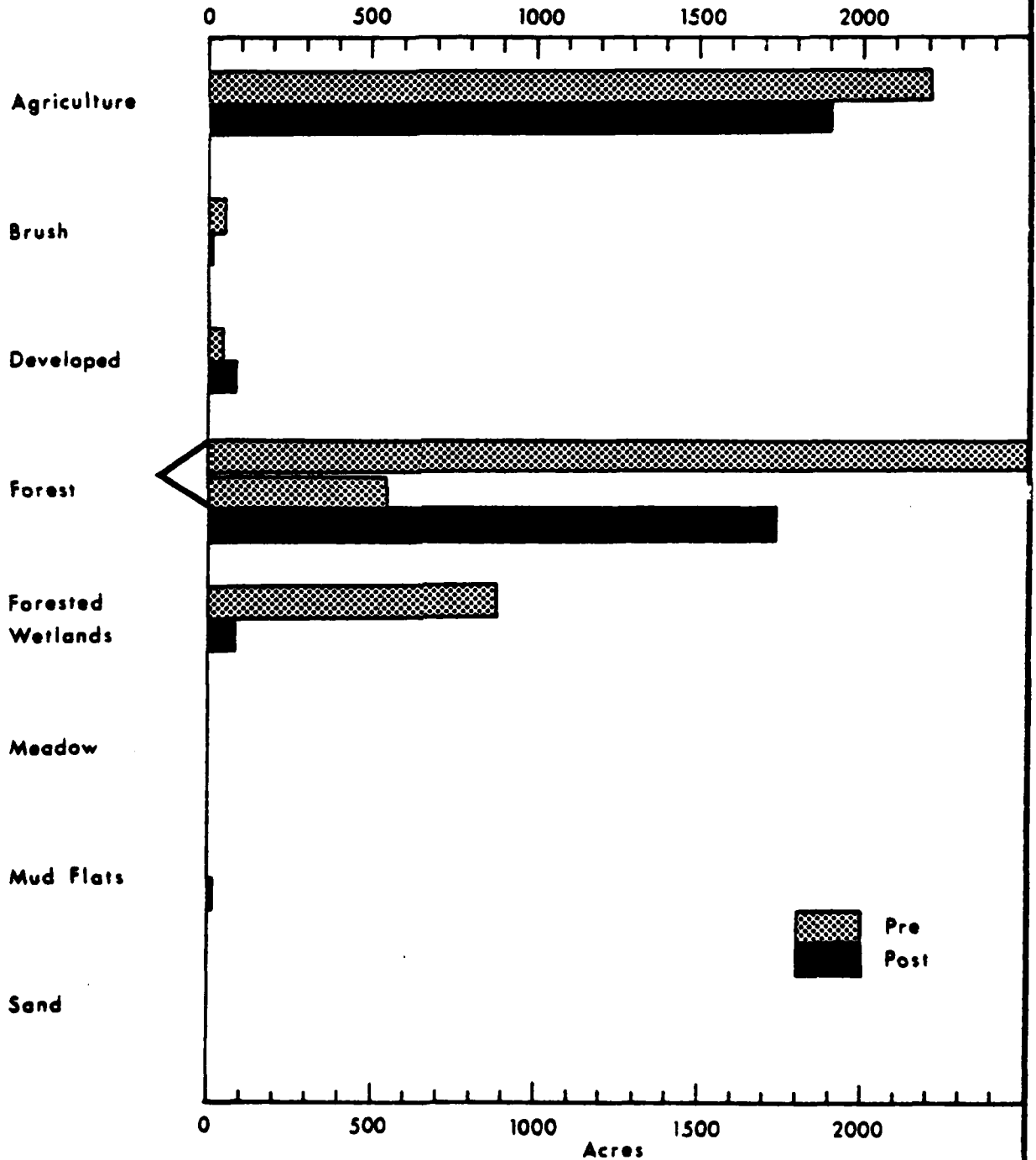
Graphs by 5 Mile Sections

TERRESTRIAL HABITAT

Illinois River, Pool 26 -- Mile 5 to Mile 10

Pre and Post Impoundment

(1927-1936) & (1975-1977)

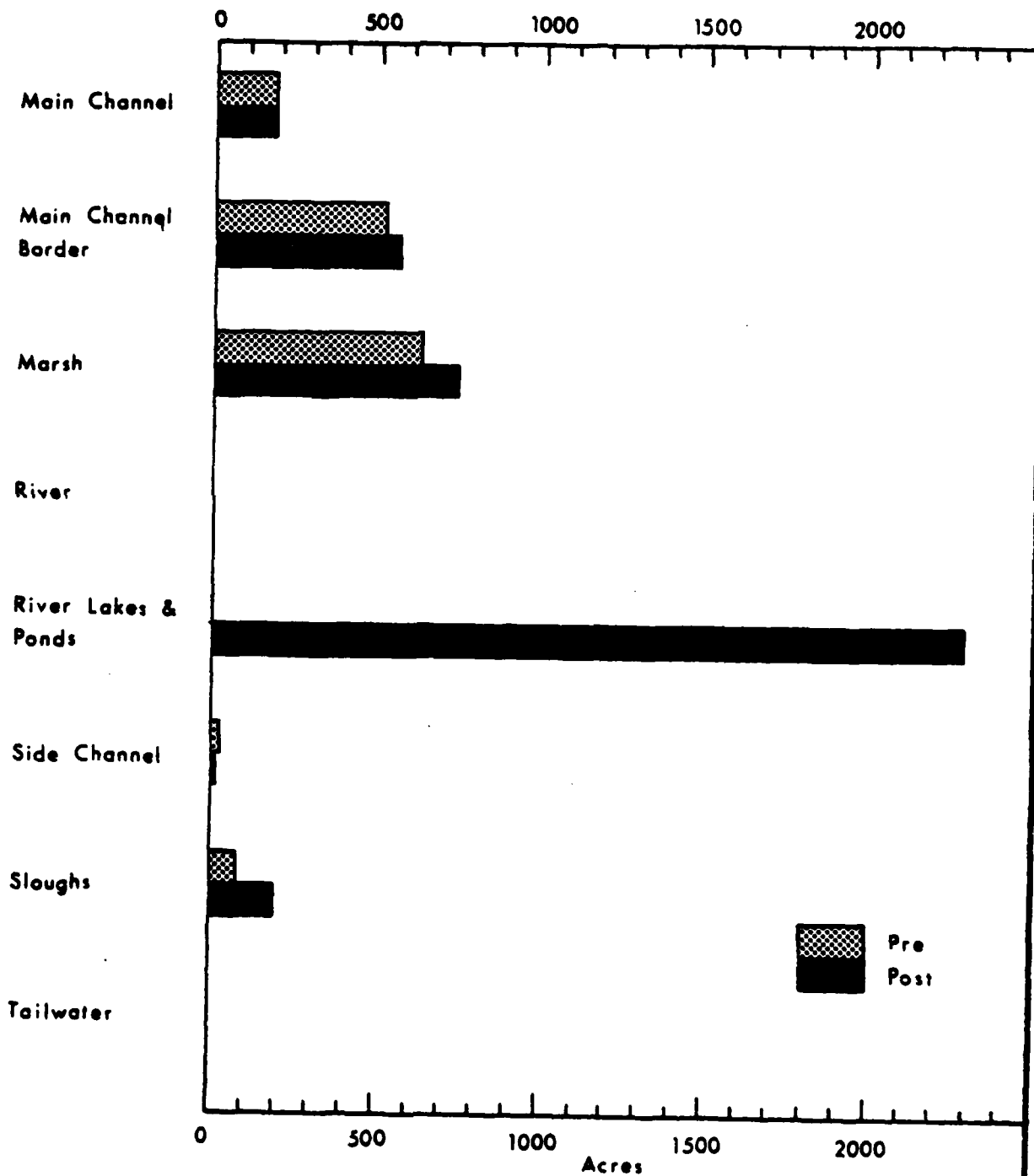


AQUATIC HABITAT

Illinois River, Pool 26 -- Mile 5 to Mile 10

Pre and Post Impoundment

(1927-1936) & (1975-1977)

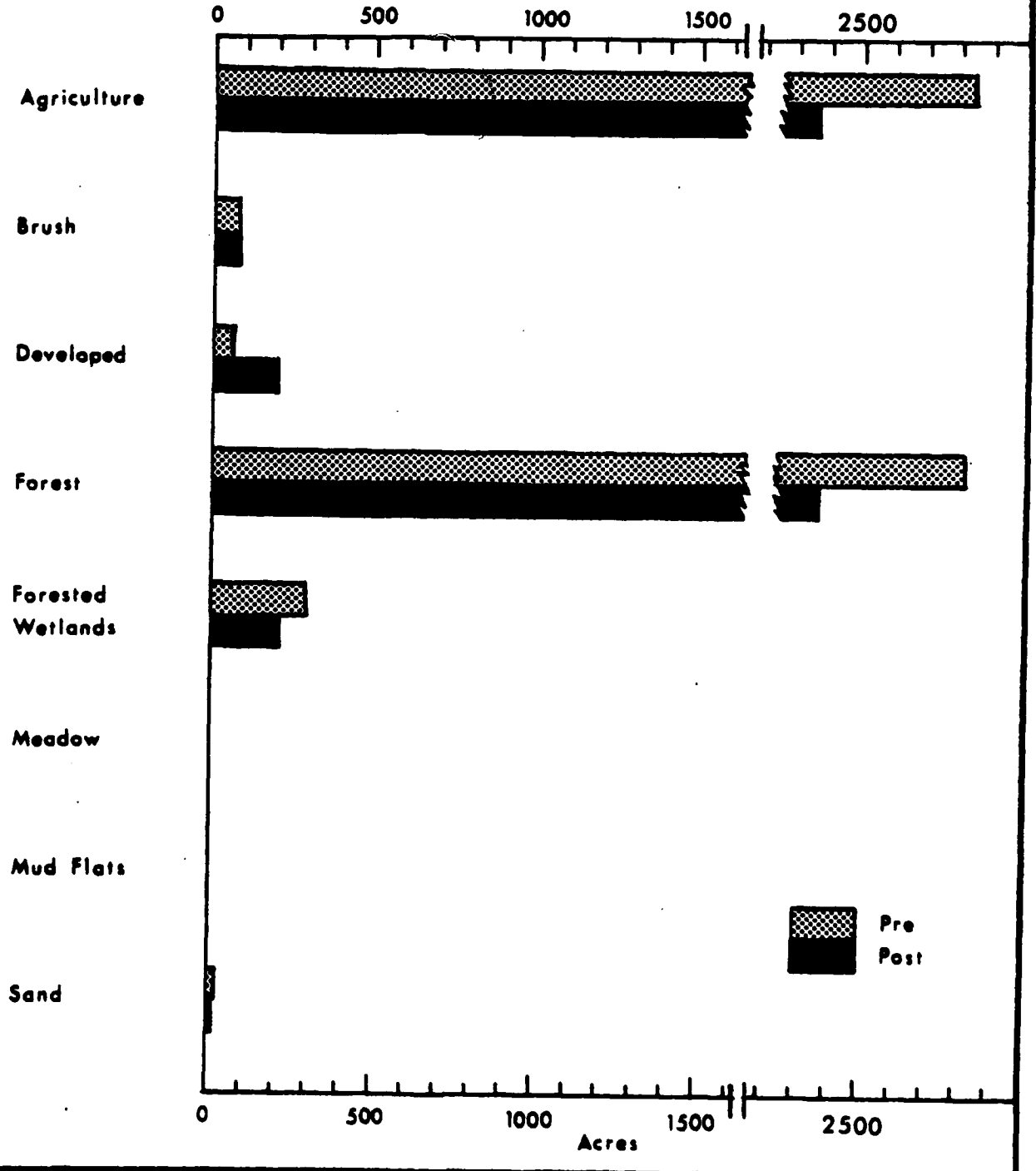


TERRESTRIAL HABITAT

Illinois River, Pool 26 -- Mile 10 to Mile 15

Pre and Post Impoundment

(1927-1936) & (1975-1977)

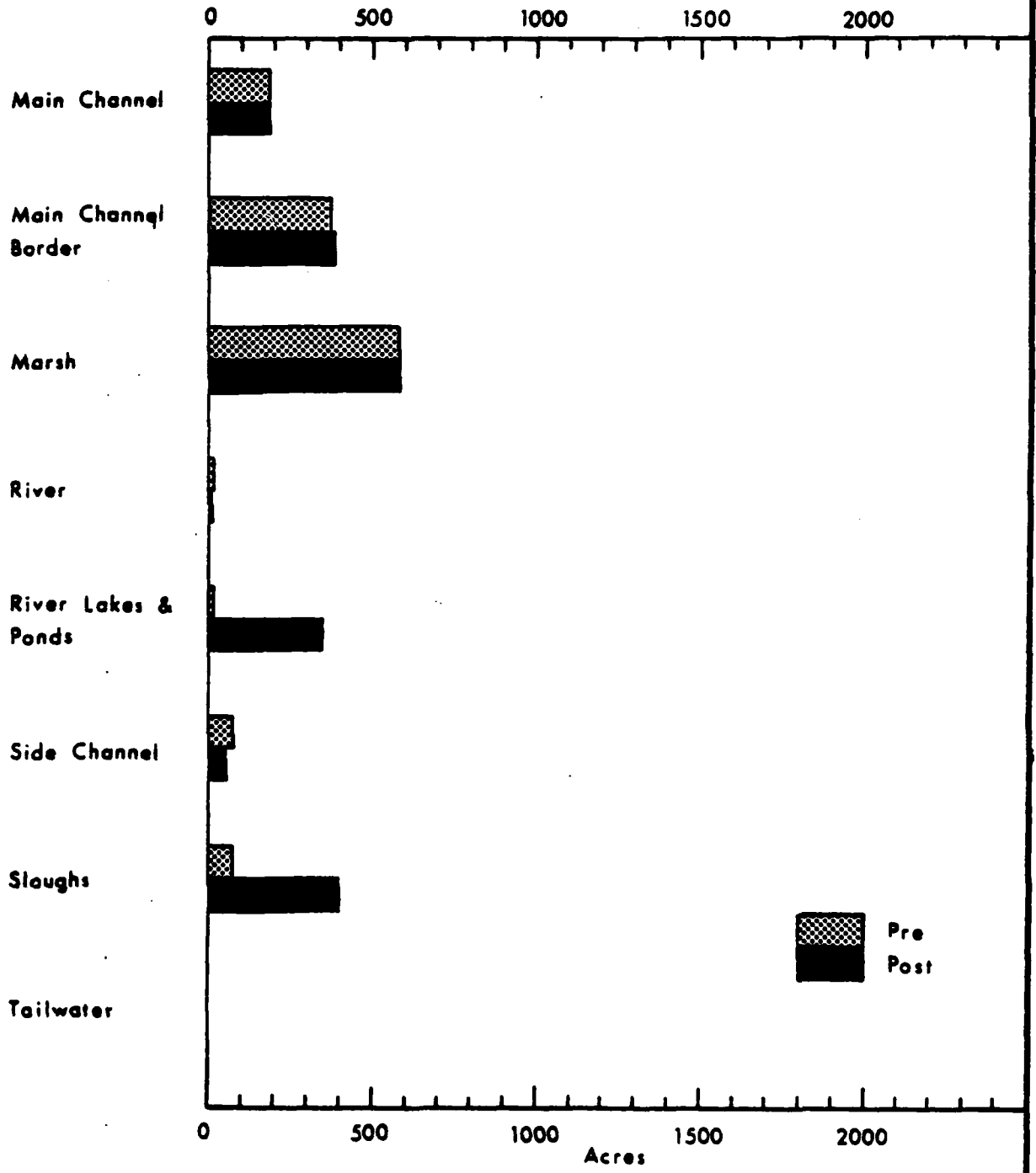


AQUATIC HABITAT

Illinois River, Pool 26 -- Mile 10 to Mile 15

Pre and Post Impoundment

(1927-1936) & (1975-1977)

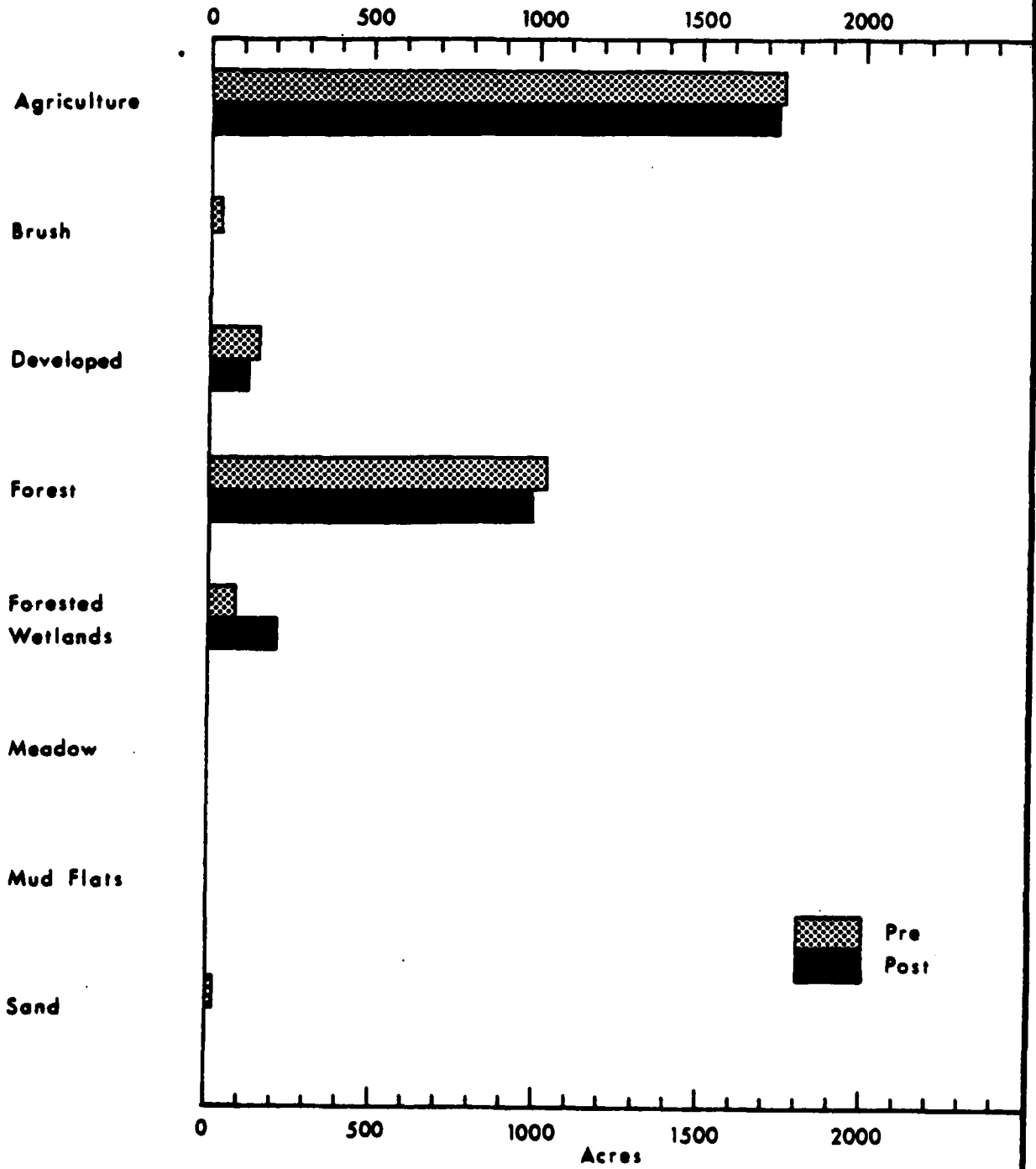


TERRESTRIAL HABITAT

Illinois River, Pool 26 -- Mile 15 to Mile 20

Pre and Post Impoundment

(1927-1936) & (1975-1977)

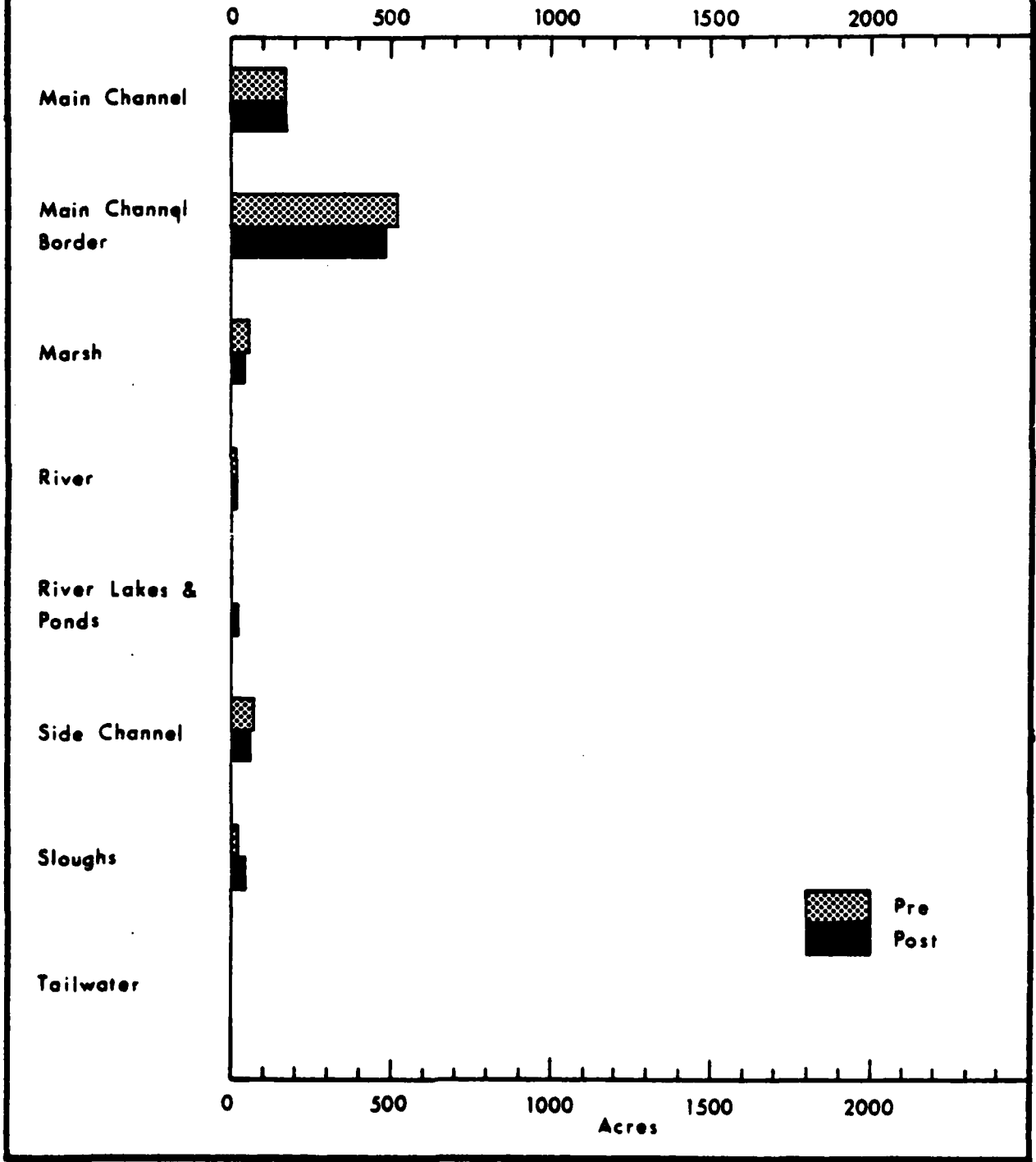


AQUATIC HABITAT

Illinois River, Pool 26 -- Mile 15 to Mile 20

Pre and Post Impoundment

(1927 - 1936) & (1975 - 1977)

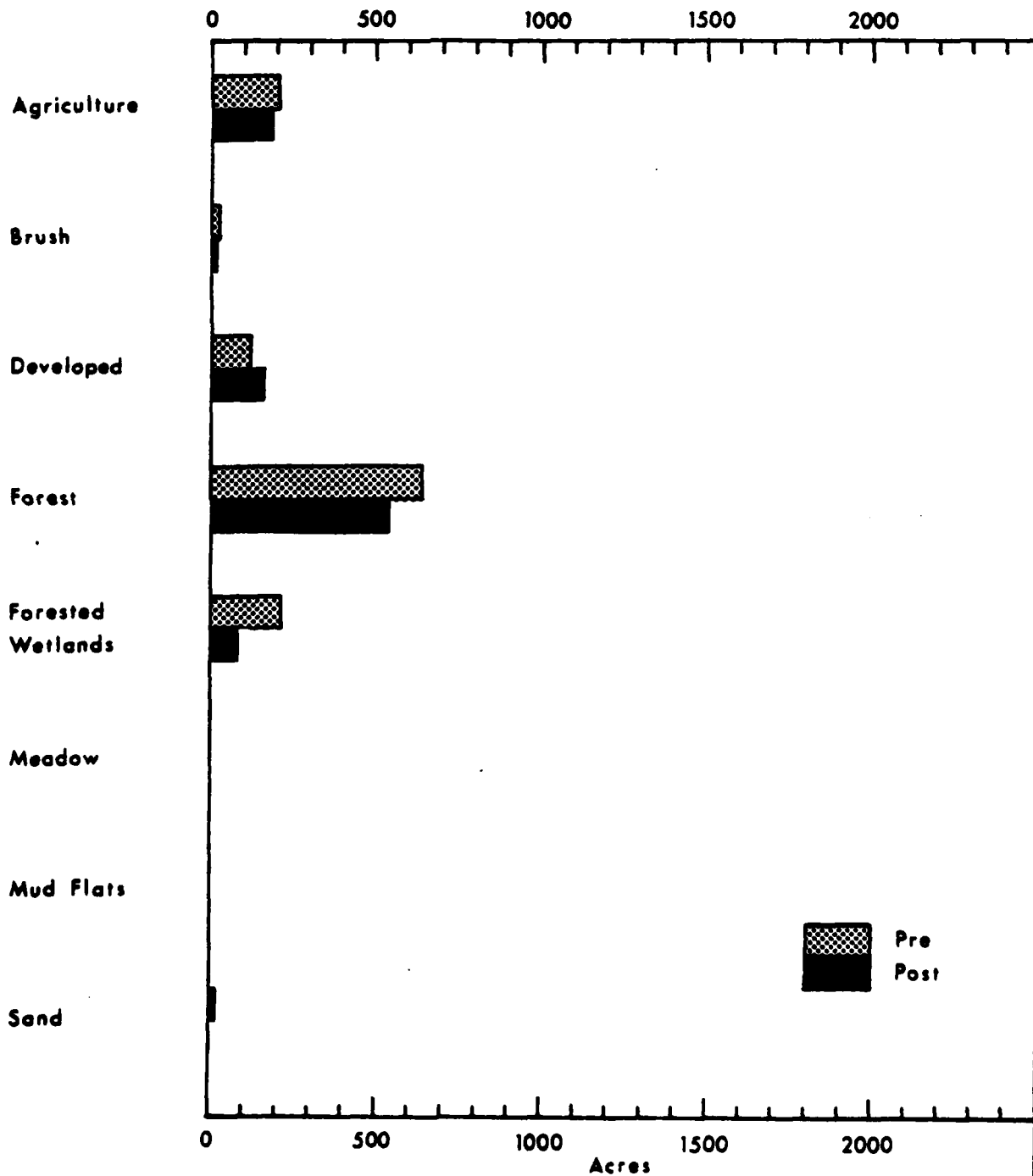


TERRESTRIAL HABITAT

Illinois River, Pool 26 -- Mile 20 to Mile 25

Pre and Post Impoundment

(1927-1936) & (1975-1977)

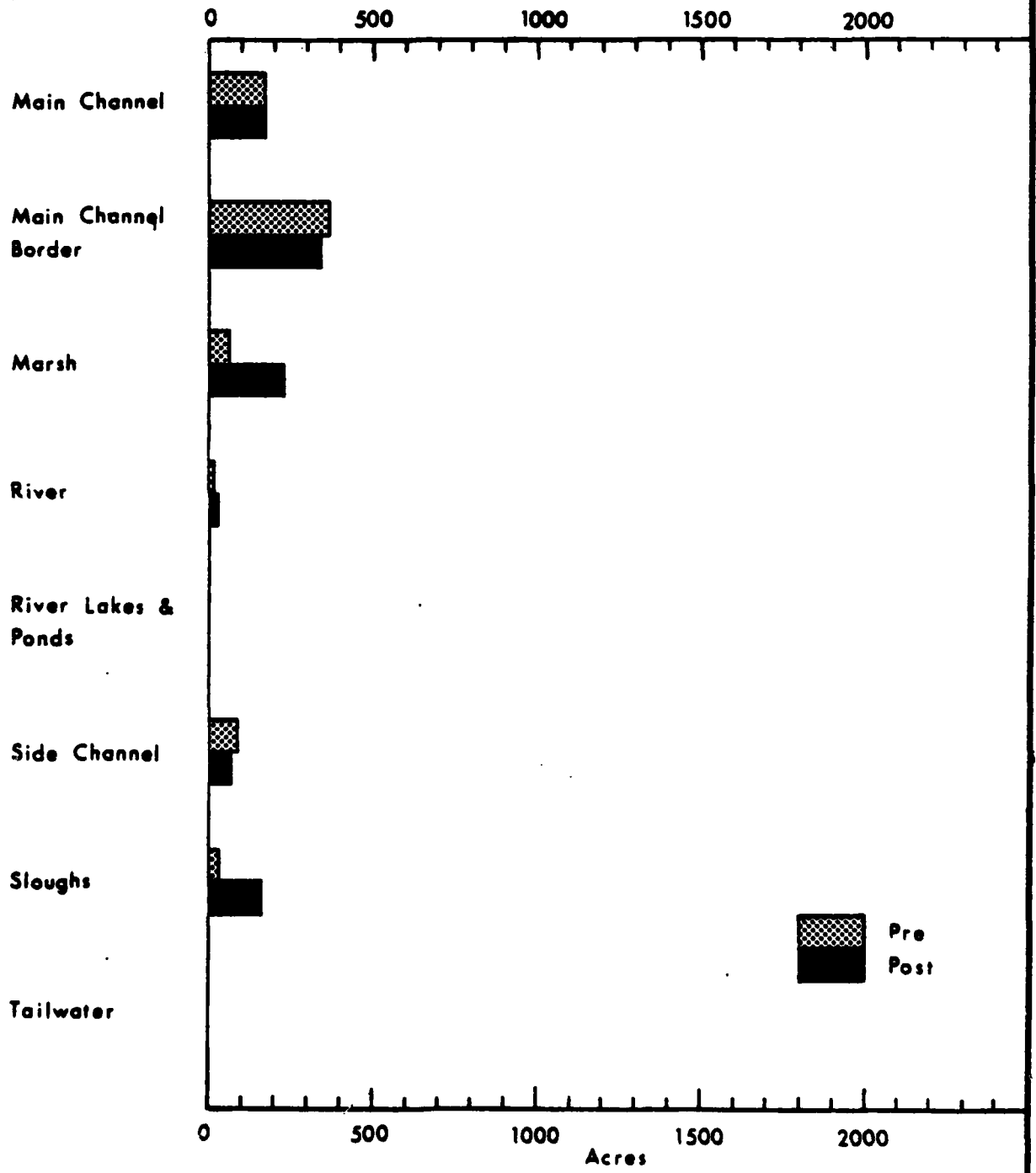


AQUATIC HABITAT

Illinois River, Pool 26 -- Mile 20 to Mile 25

Pre and Post Impoundment

(1927-1936) & (1975-1977)

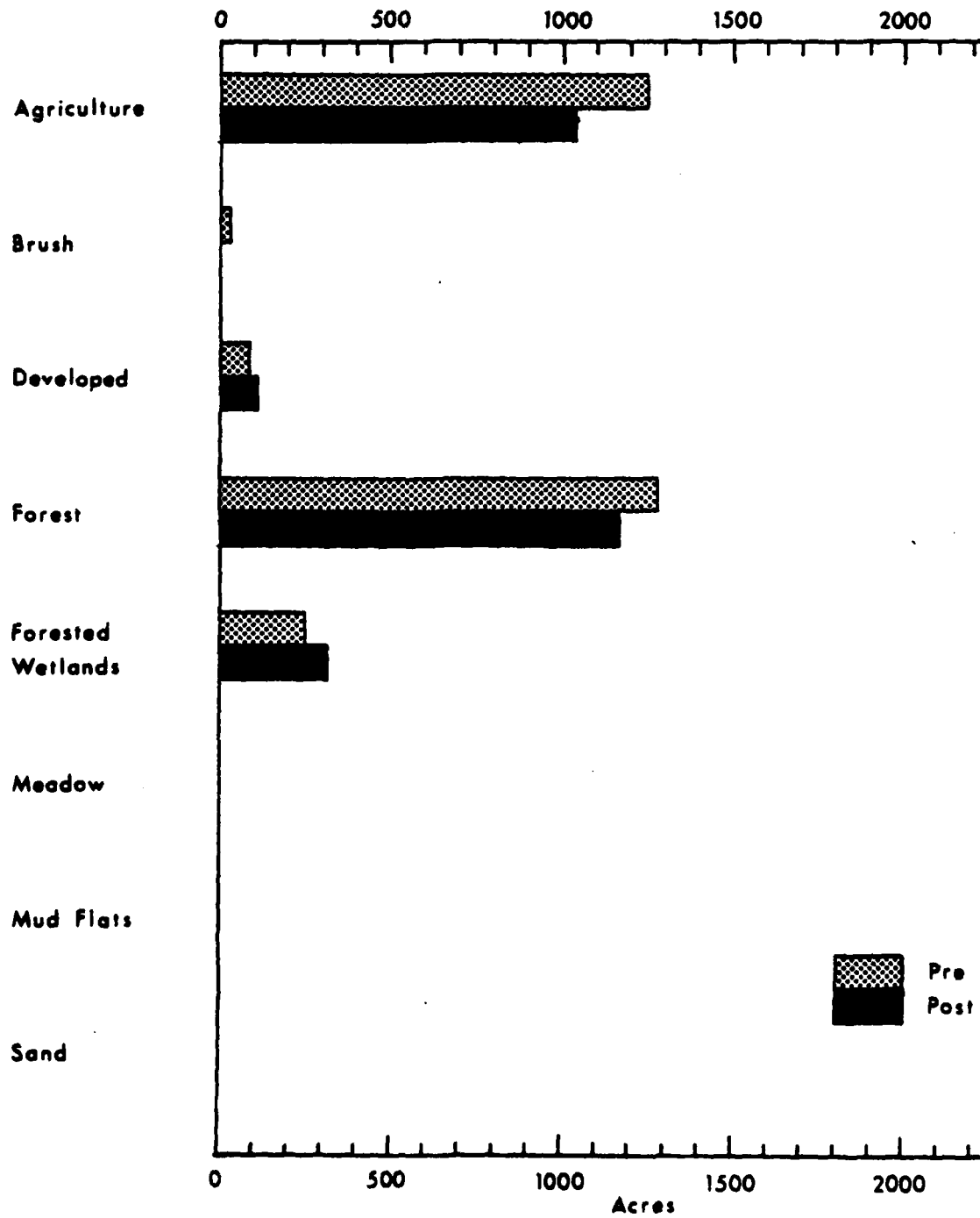


TERRESTRIAL HABITAT

Illinois River, Pool 26 -- Mile 25 to Mile 30

Pre and Post Impoundment

(1927-1936) & (1975-1977)

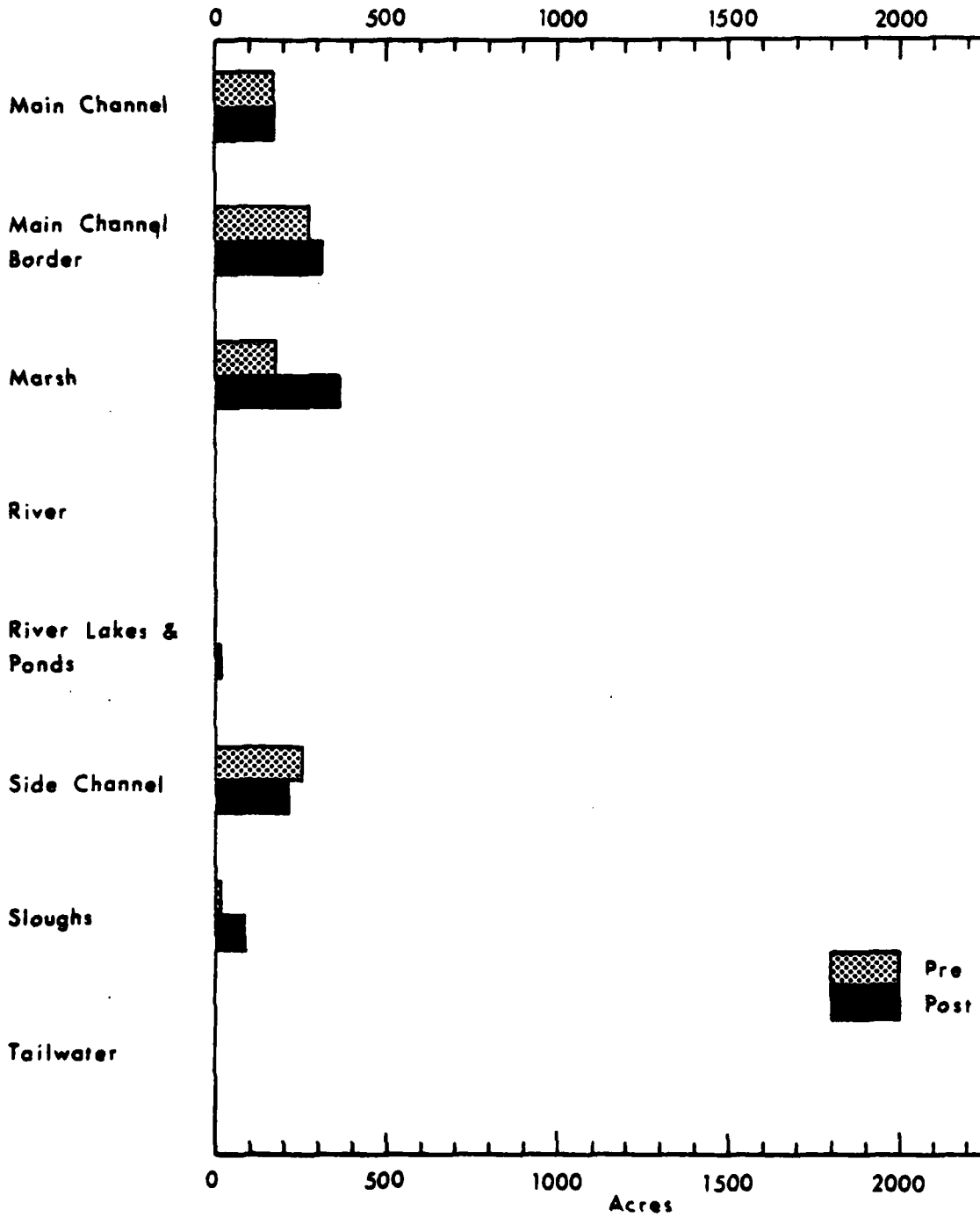


AQUATIC HABITAT

Illinois River, Pool 26 -- Mile 25 to Mile 30

Pre and Post Impoundment

(1927-1936) & (1975-1977)

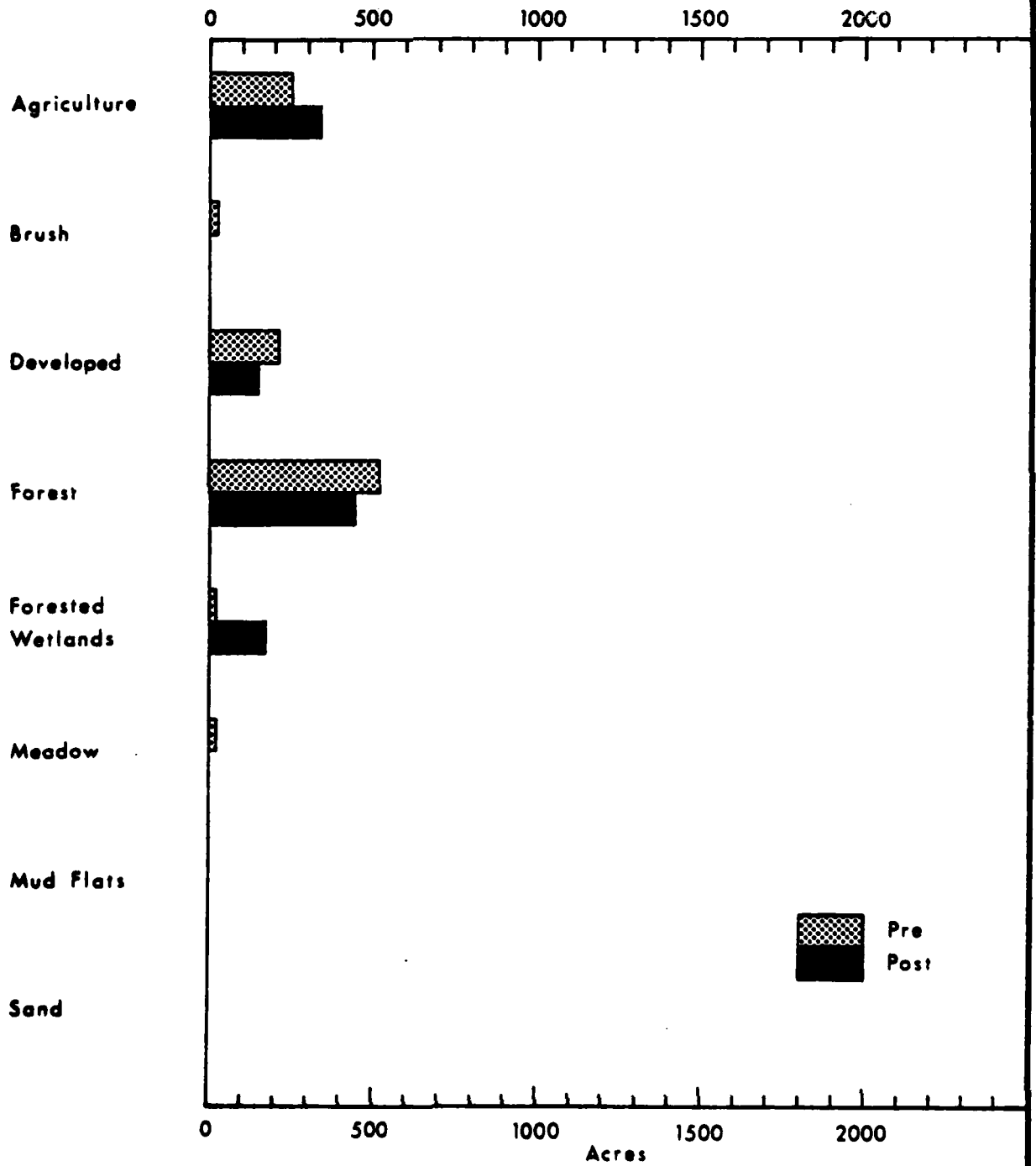


TERRESTRIAL HABITAT

Illinois River, Pool 26 -- Mile 30 to Mile 35

Pre and Post Impoundment

(1927-1936) & (1975-1977)

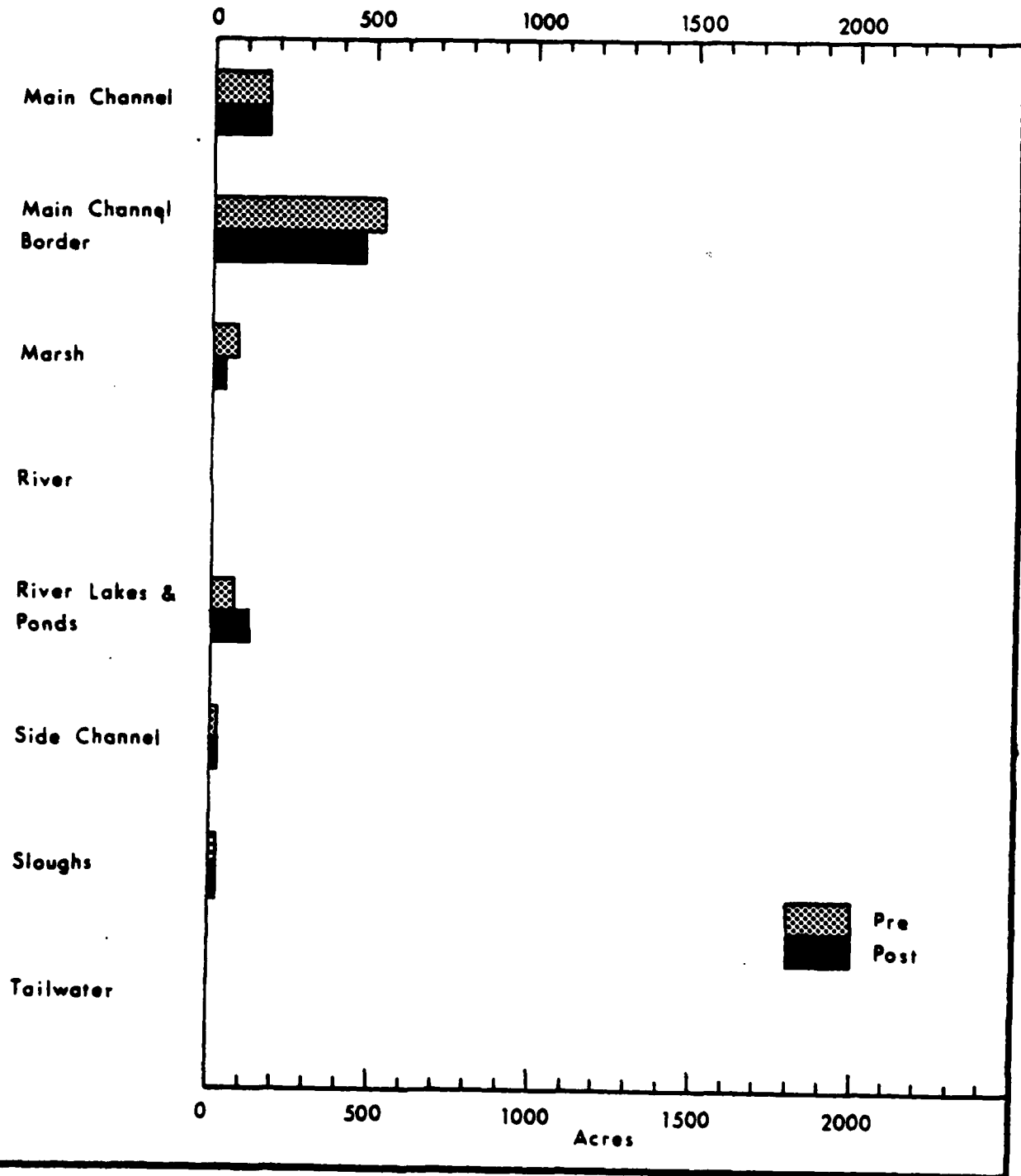


AQUATIC HABITAT

Illinois River, Pool 26 -- Mile 30 to Mile 35

Pre and Post Impoundment

(1927-1936) & (1975-1977)

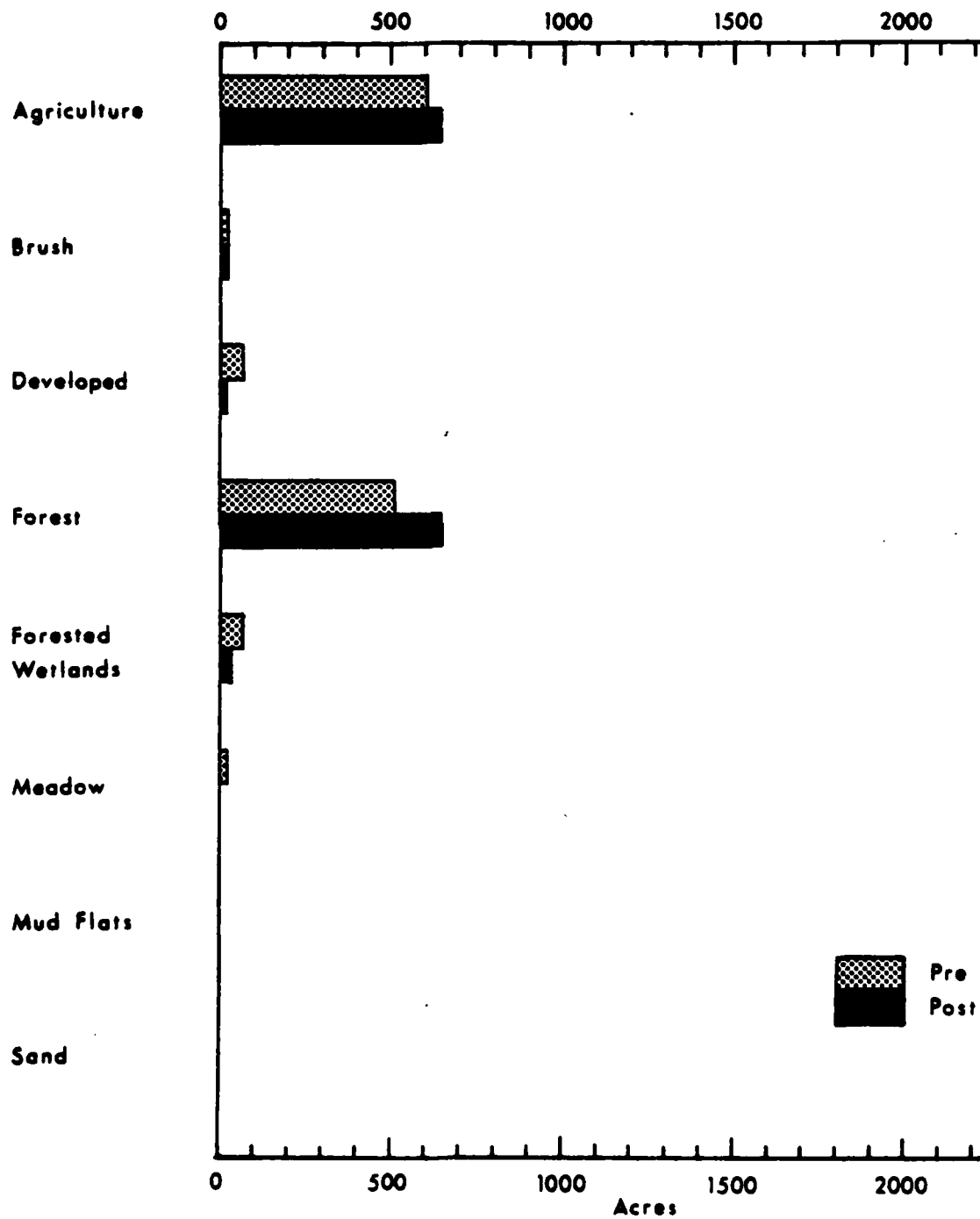


TERRESTRIAL HABITAT

Illinois River, Pool 26 -- Mile 35 to Mile 40

Pre and Post Impoundment

(1927-1936) & (1975-1977)

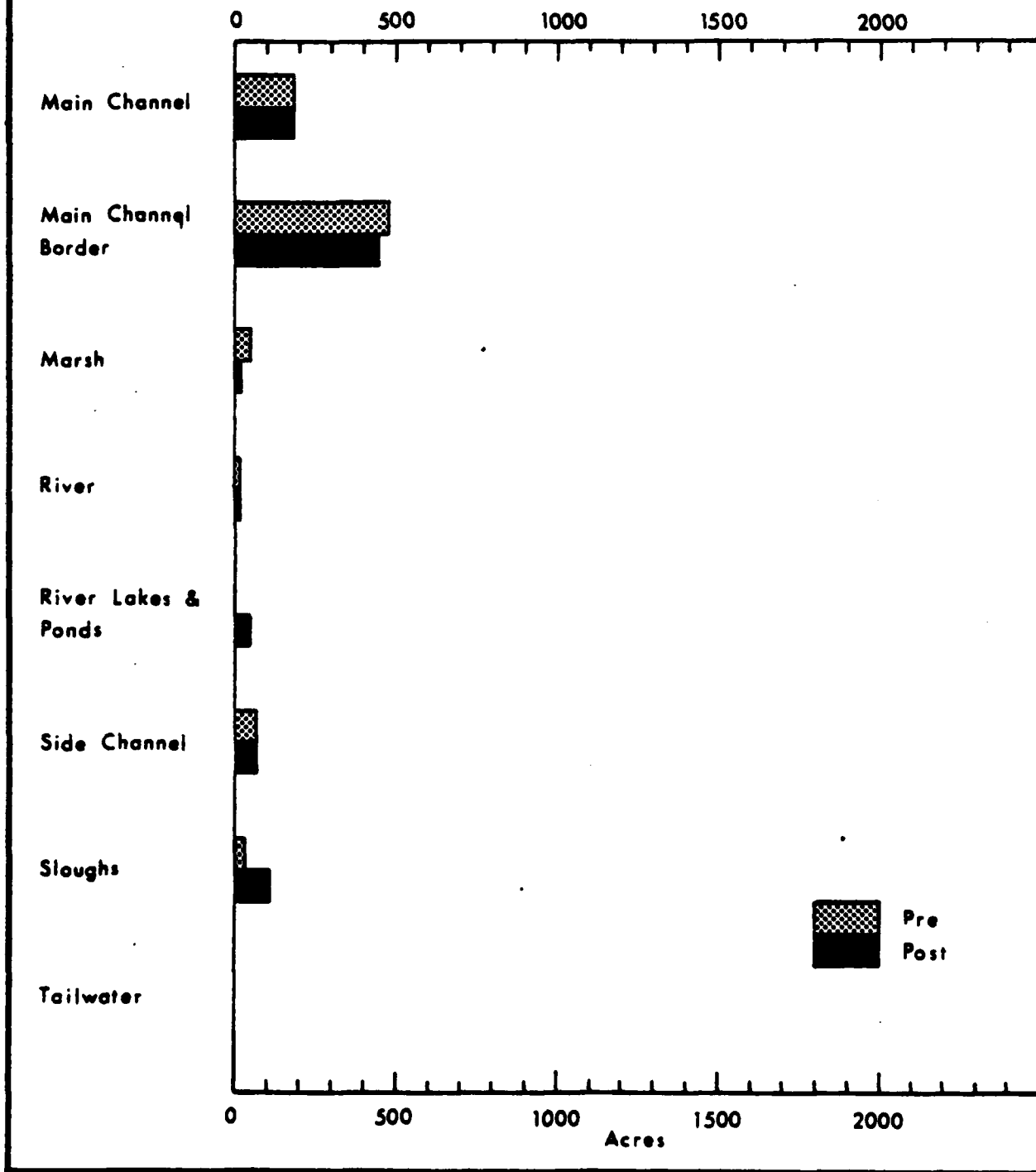


AQUATIC HABITAT

Illinois River, Pool 26 -- Mile 35 to Mile 40

Pre and Post Impoundment

(1927 - 1936) & (1975 - 1977)

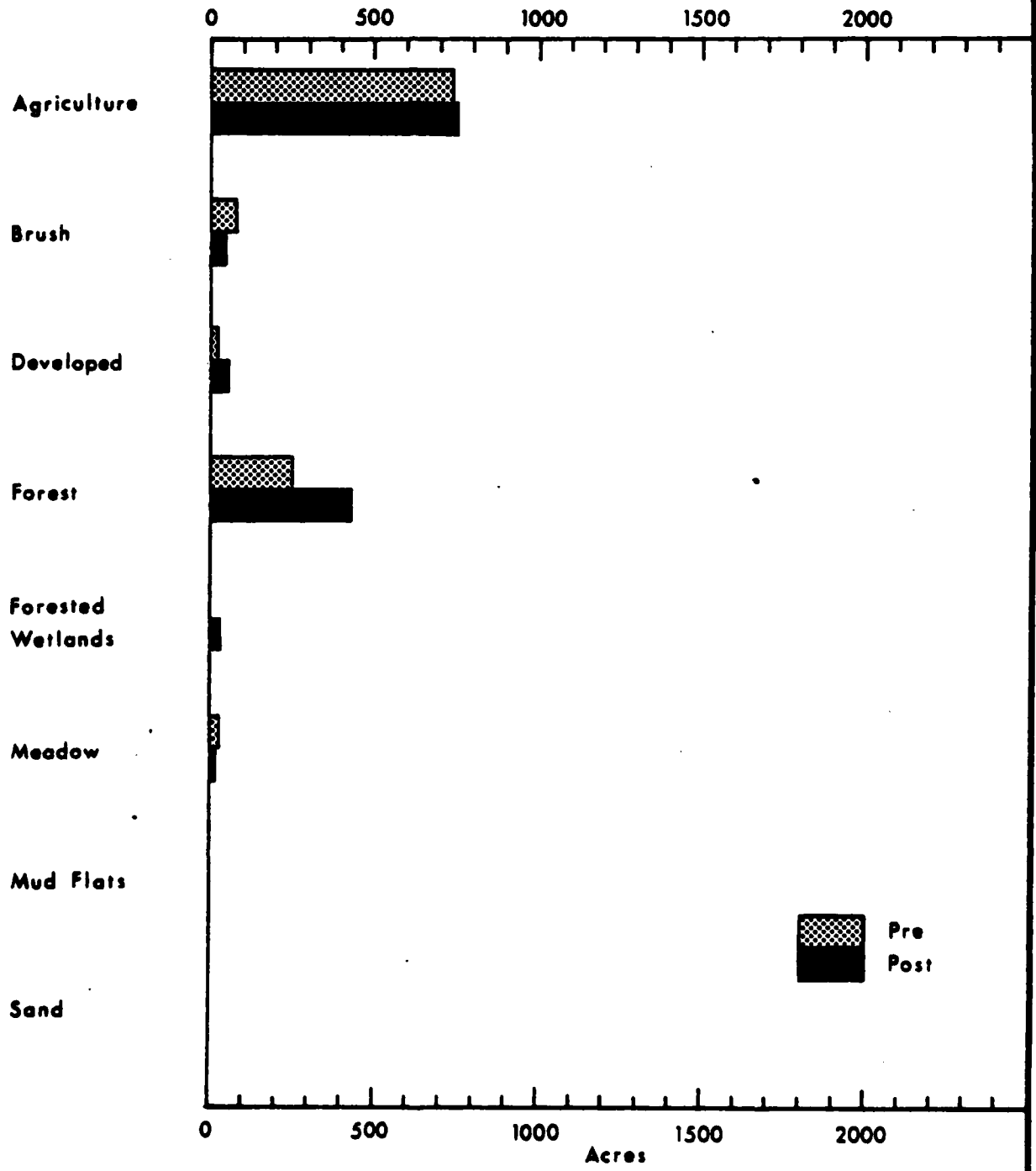


TERRESTRIAL HABITAT

Illinois River, Pool 26 -- Mile 40 to Mile 45

Pre and Post Impoundment

(1927 - 1936) & (1975 - 1977)

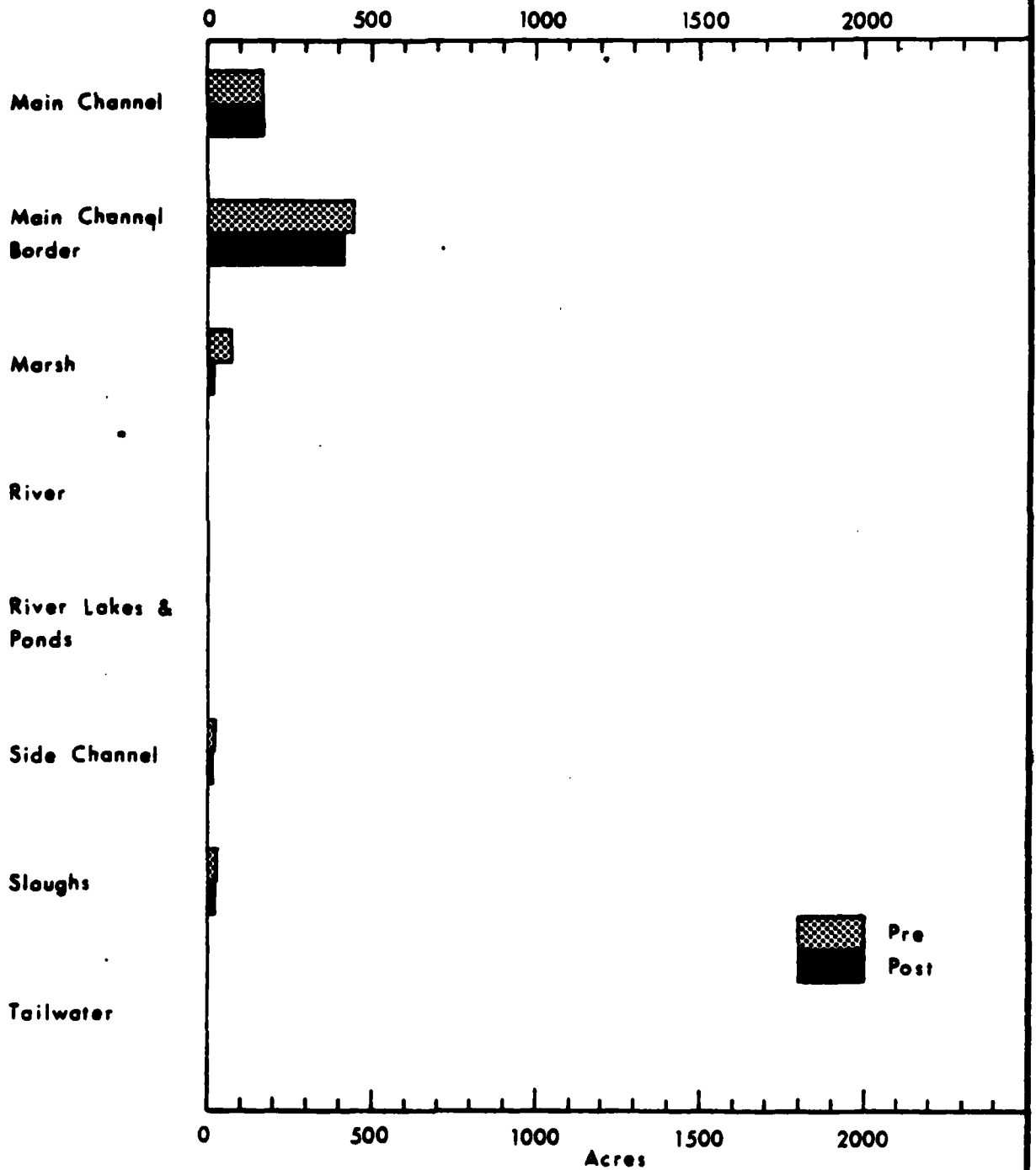


AQUATIC HABITAT

Illinois River, Pool 26 -- Mile 40 to Mile 45

Pre and Post Impoundment

(1927-1936) & (1975-1977)

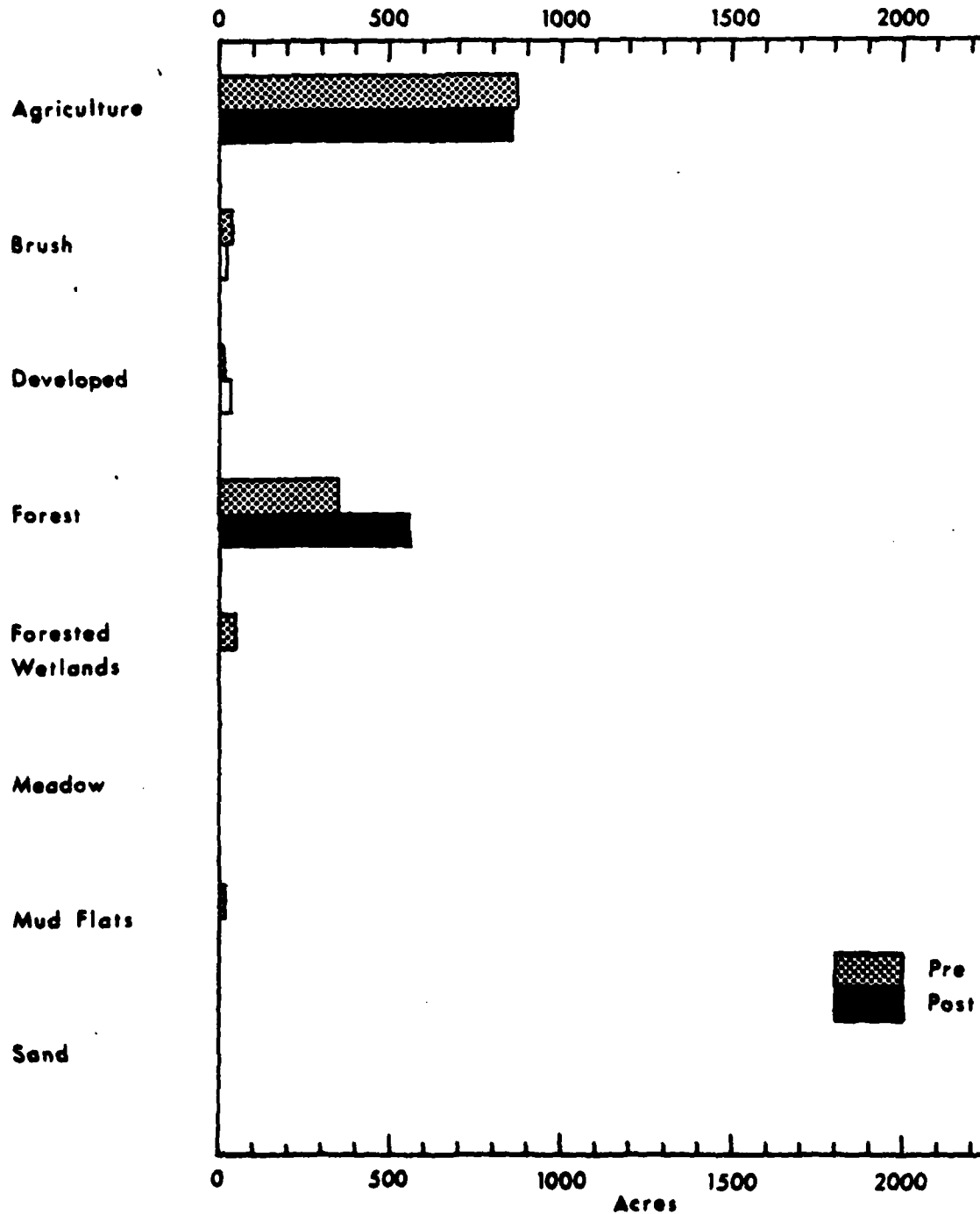


TERRESTRIAL HABITAT

Illinois River, Pool 26 -- Mile 45 to Mile 50

Pre and Post Impoundment

(1927-1936) & (1975-1977)

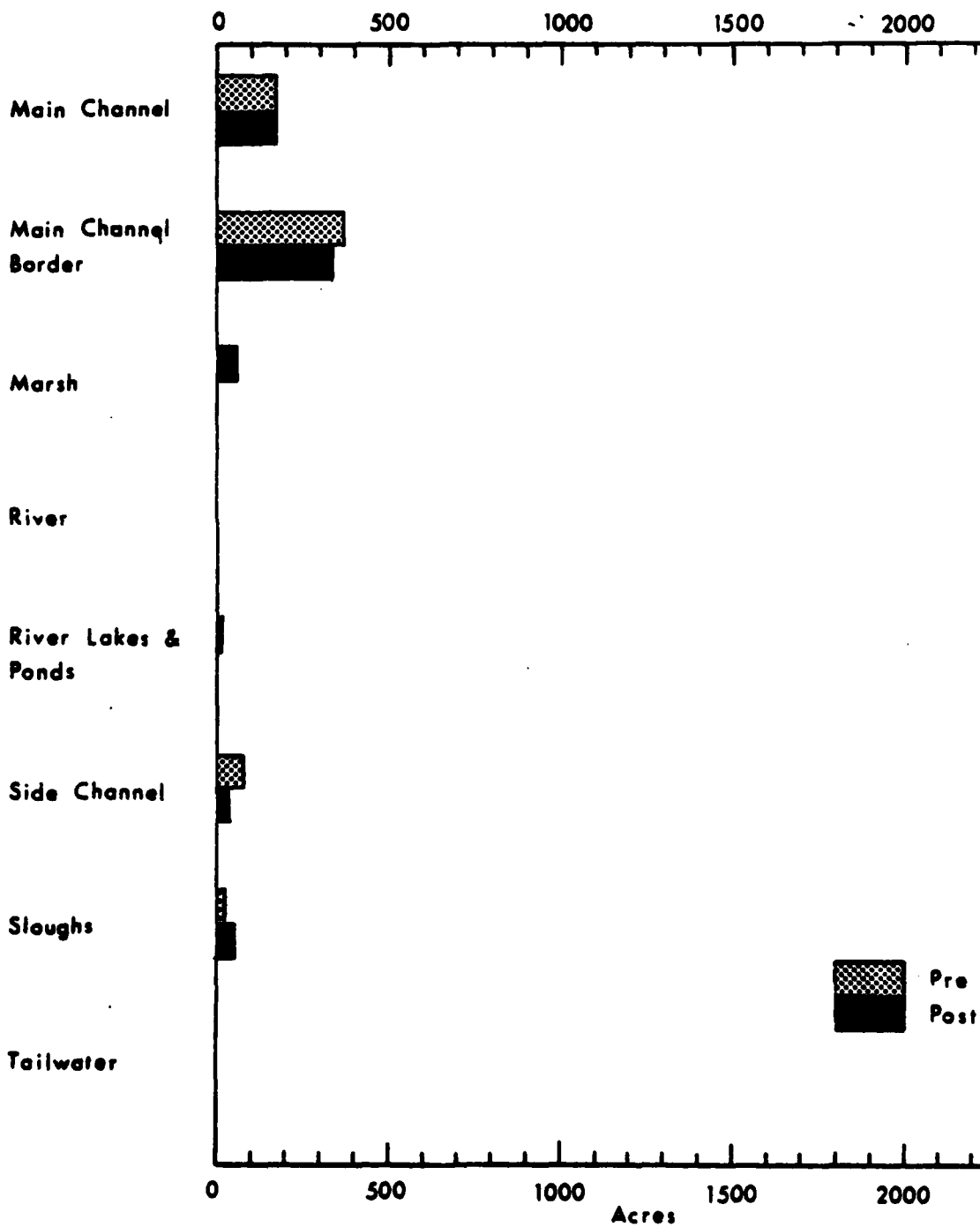


AQUATIC HABITAT

Illinois River, Pool 26 -- Mile 45 to Mile 50

Pre and Post Impoundment

(1927-1936) & (1975-1977)

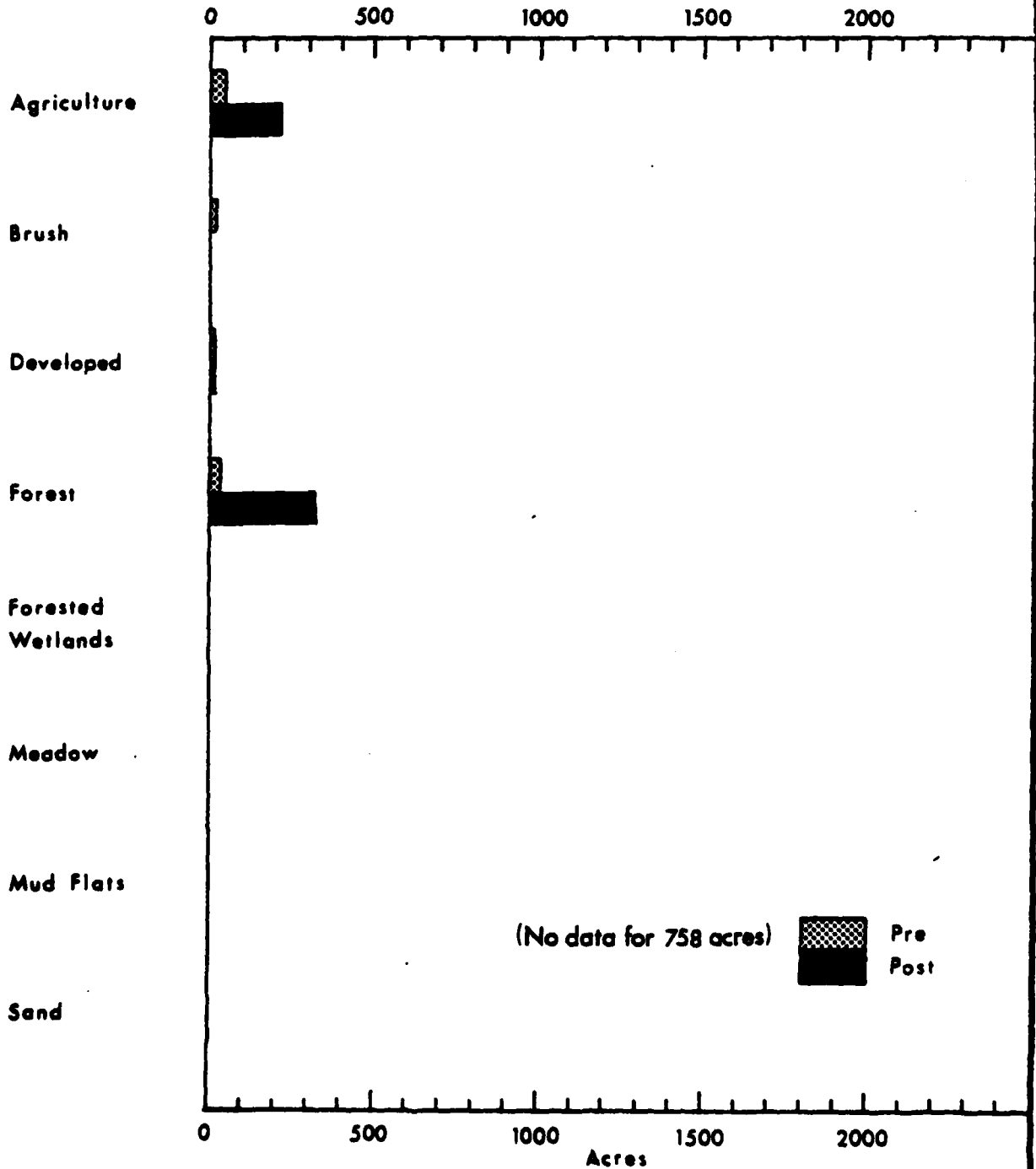


TERRESTRIAL HABITAT

Illinois River, Pool 26 -- Mile 50 to Mile 55

Pre and Post Impoundment

(1927 - 1936) & (1975 - 1977)

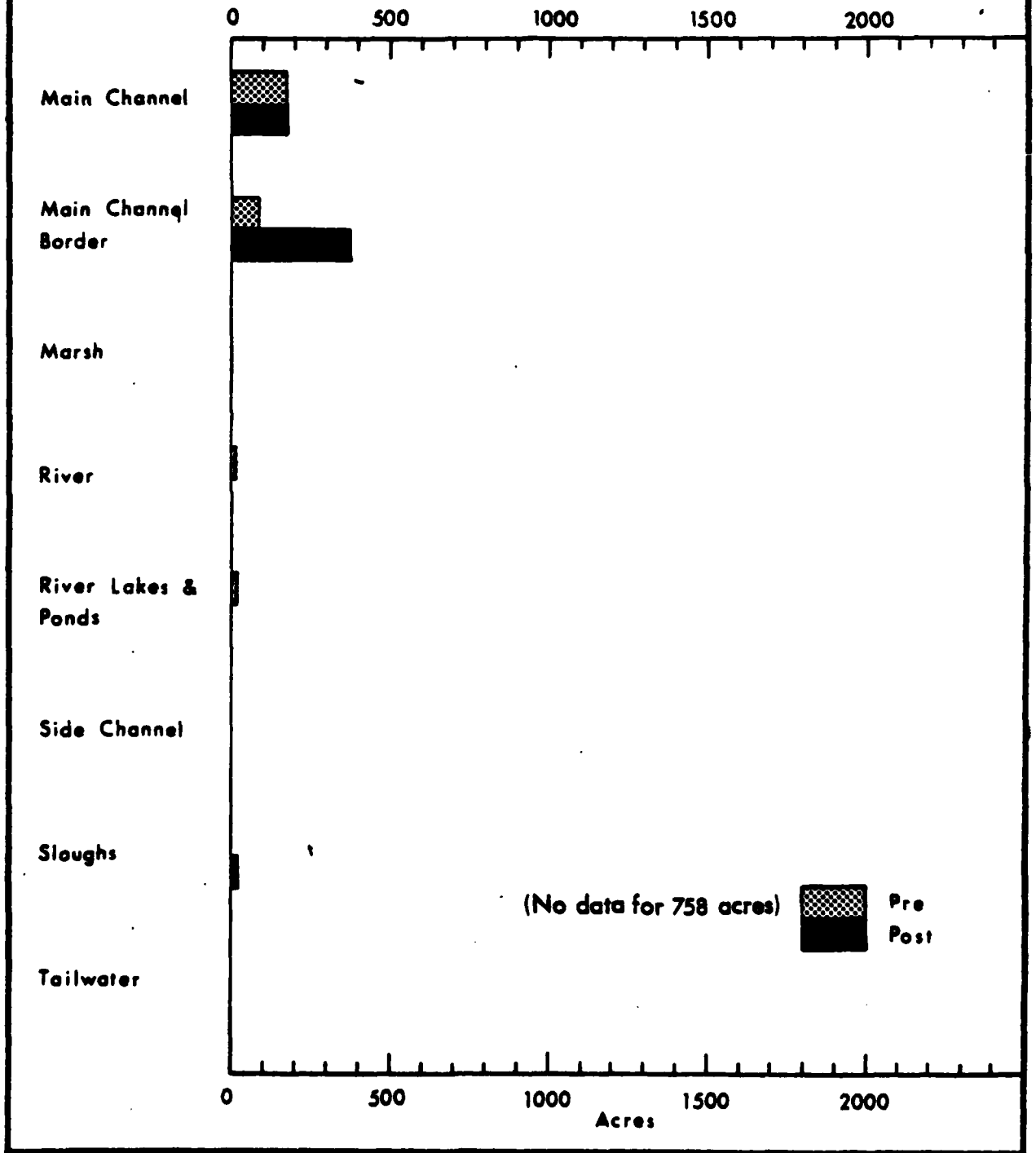


AQUATIC HABITAT

Illinois River, Pool 26 -- Mile 50 to Mile 55

Pre and Post Impoundment

(1927-1936) & (1975-1977)

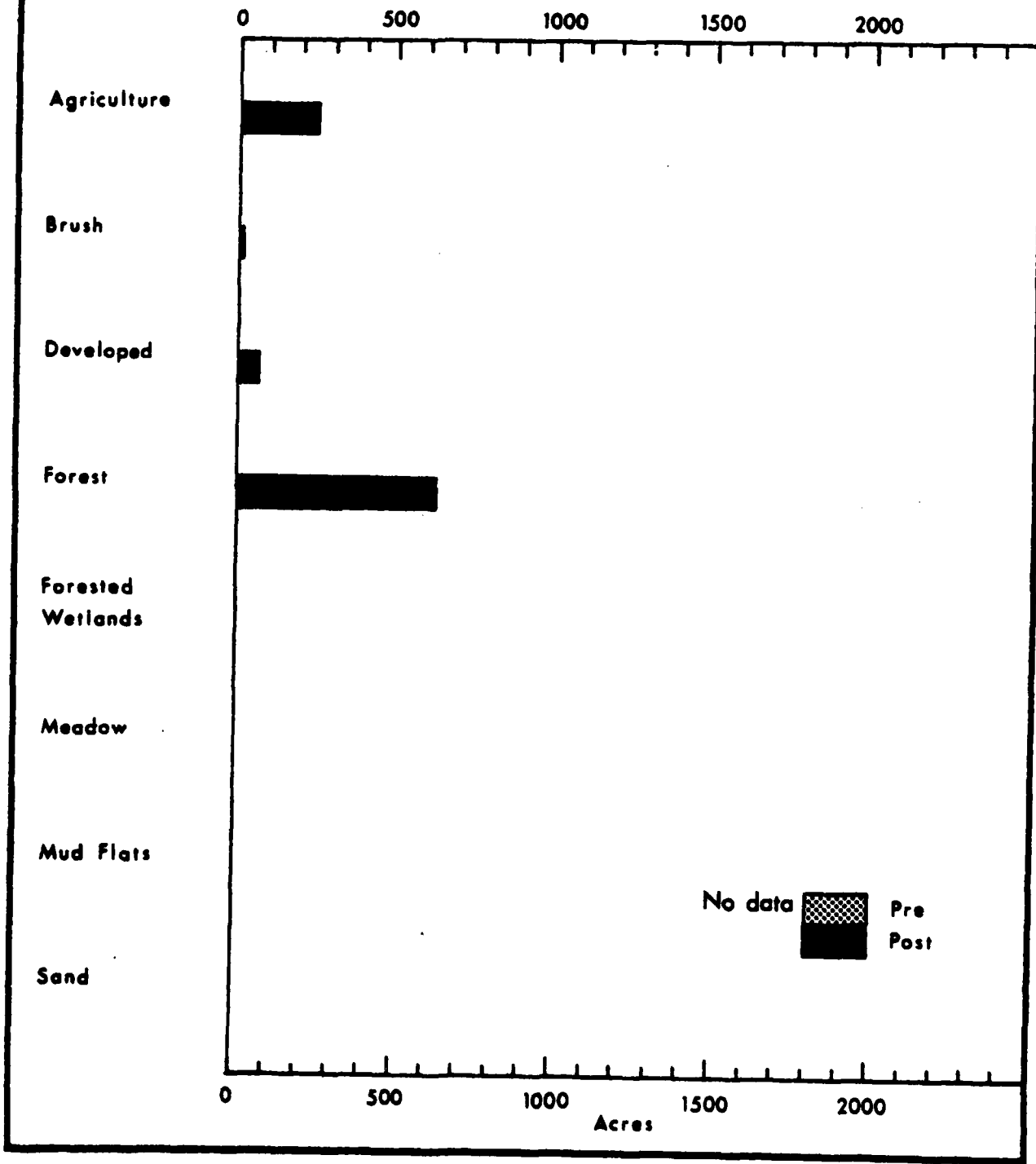


TERRESTRIAL HABITAT

Illinois River, Pool 26 -- Mile 55 to Mile 60

Pre and Post Impoundment

(1927-1936) & (1975-1977)

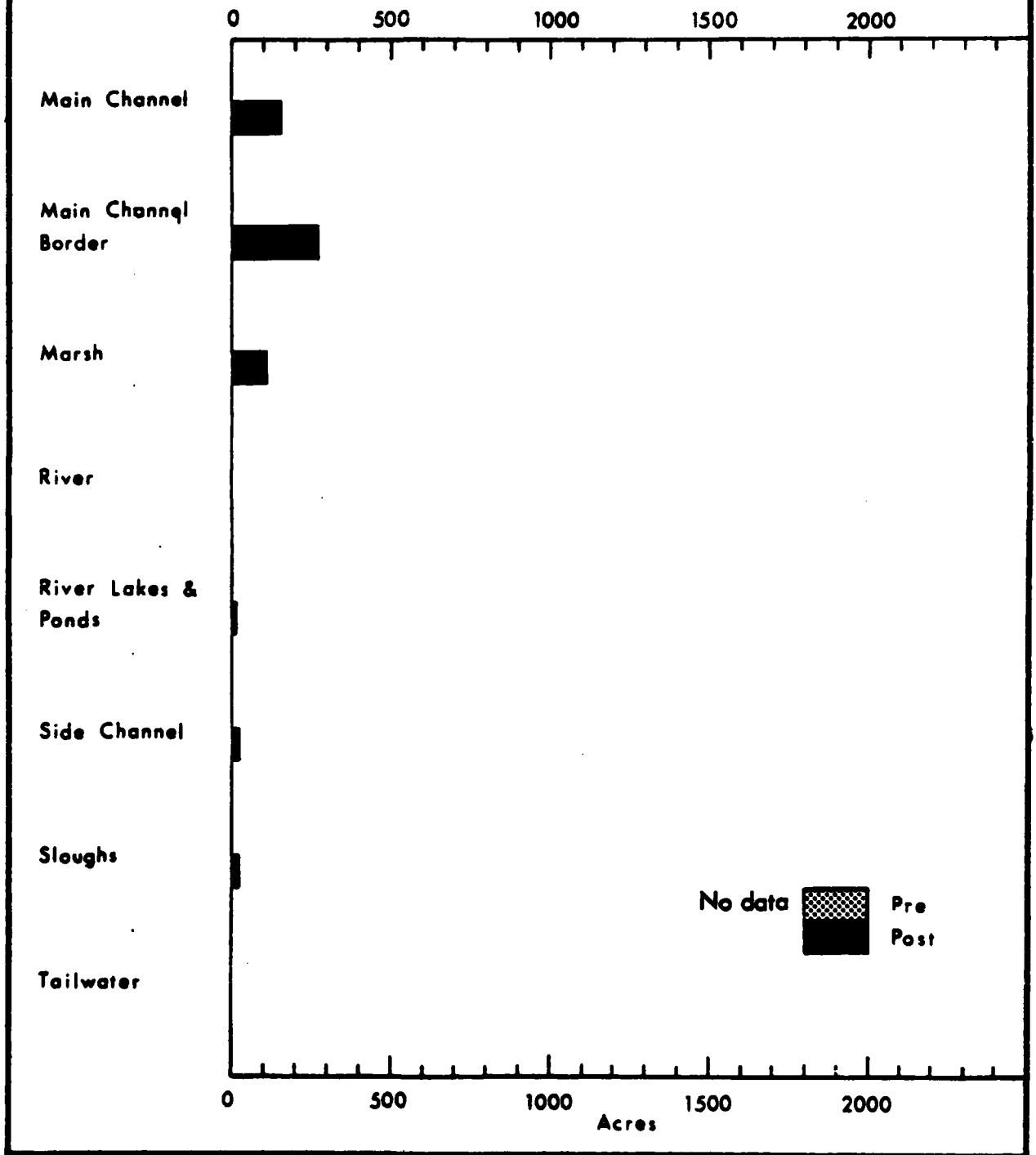


AQUATIC HABITAT

Illinois River, Pool 26 -- Mile 55 to Mile 60

Pre and Post Impoundment

(1927 - 1936) & (1975 - 1977)

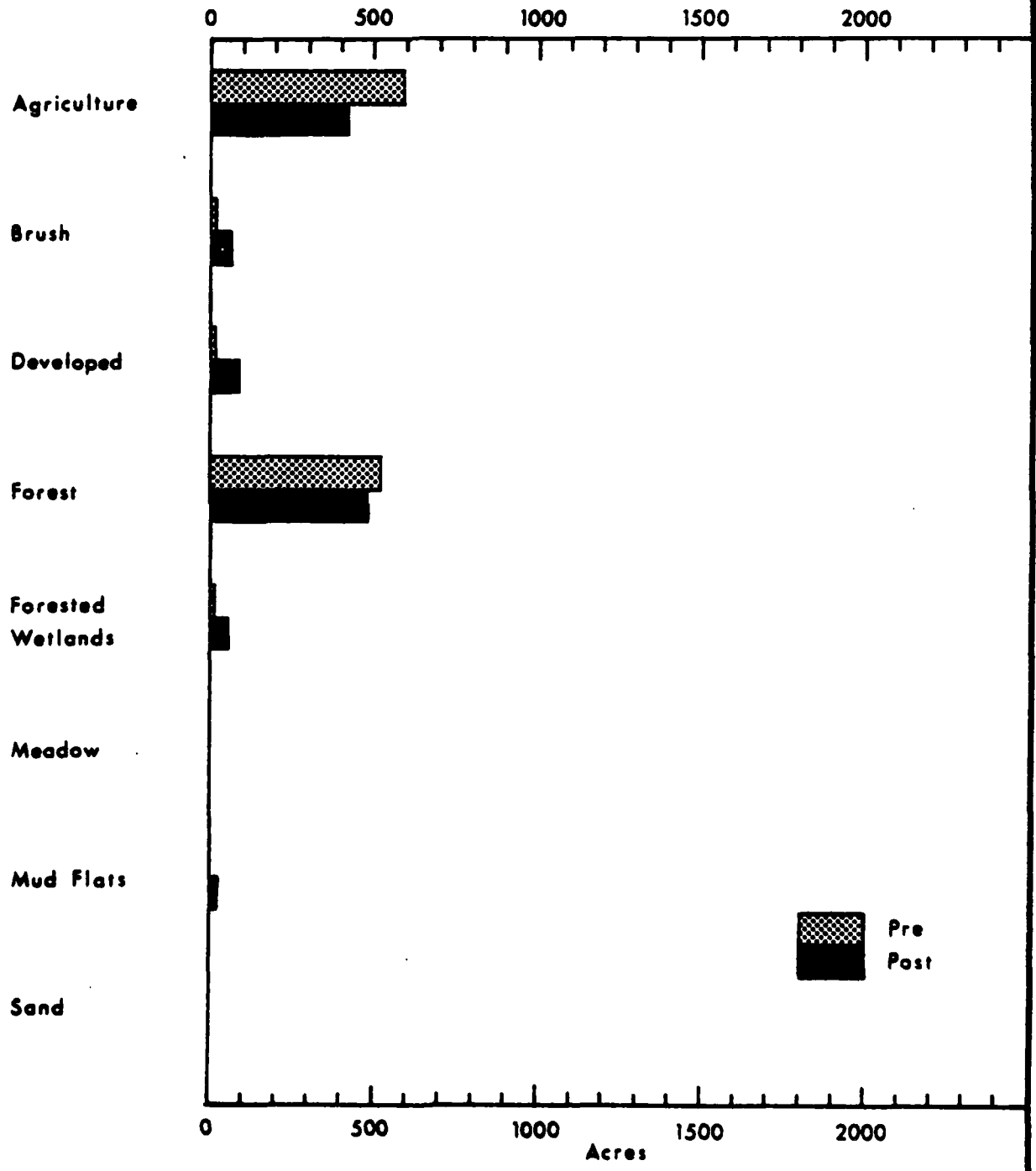


TERRESTRIAL HABITAT

Illinois River, Pool 26 -- Mile 60 to Mile 65

Pre and Post Impoundment

(1927-1936) & (1975-1977)

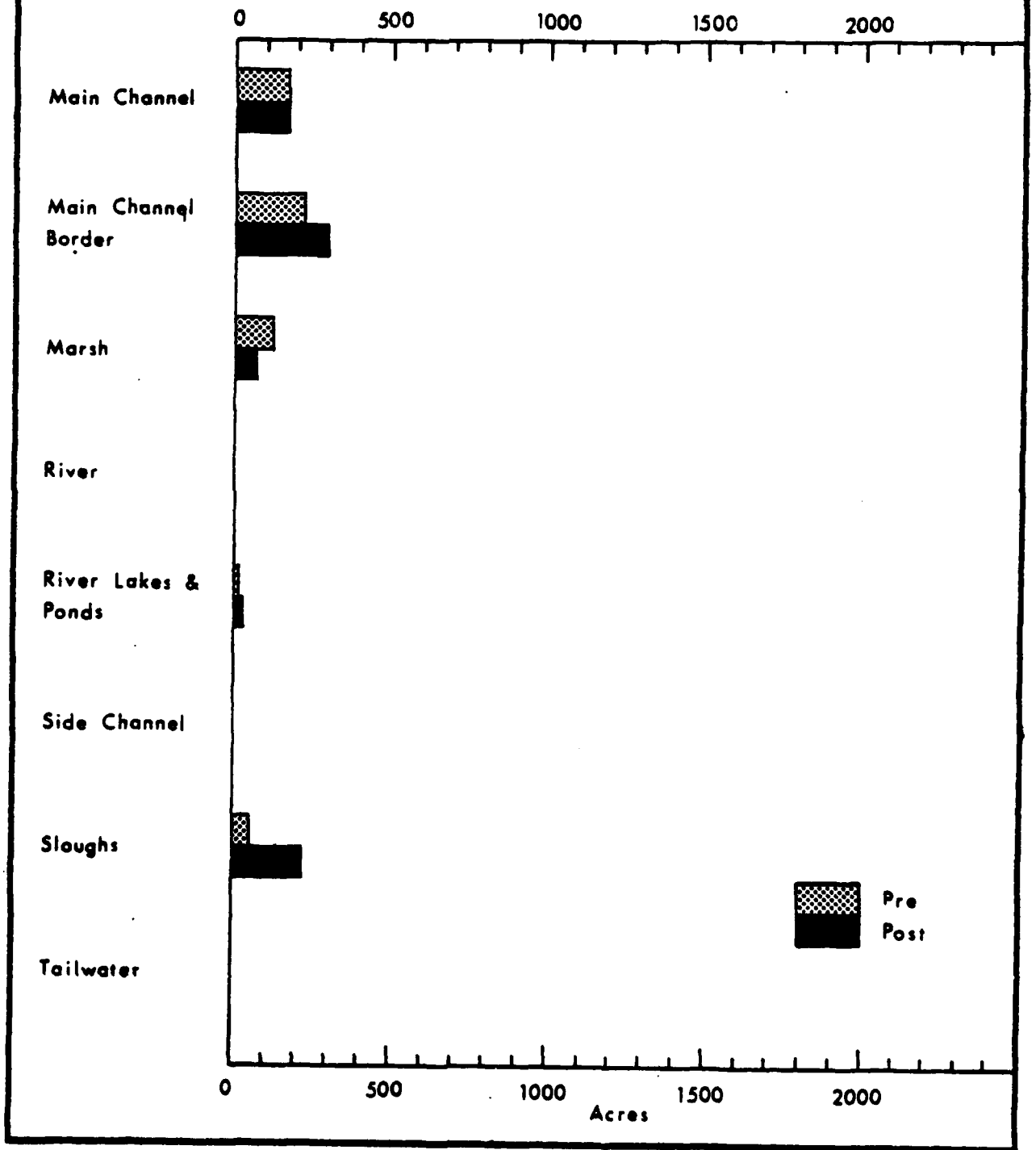


AQUATIC HABITAT

Illinois River, Pool 26 -- Mile 60 to Mile 65

Pre and Post Impoundment

(1927-1936) & (1975-1977)

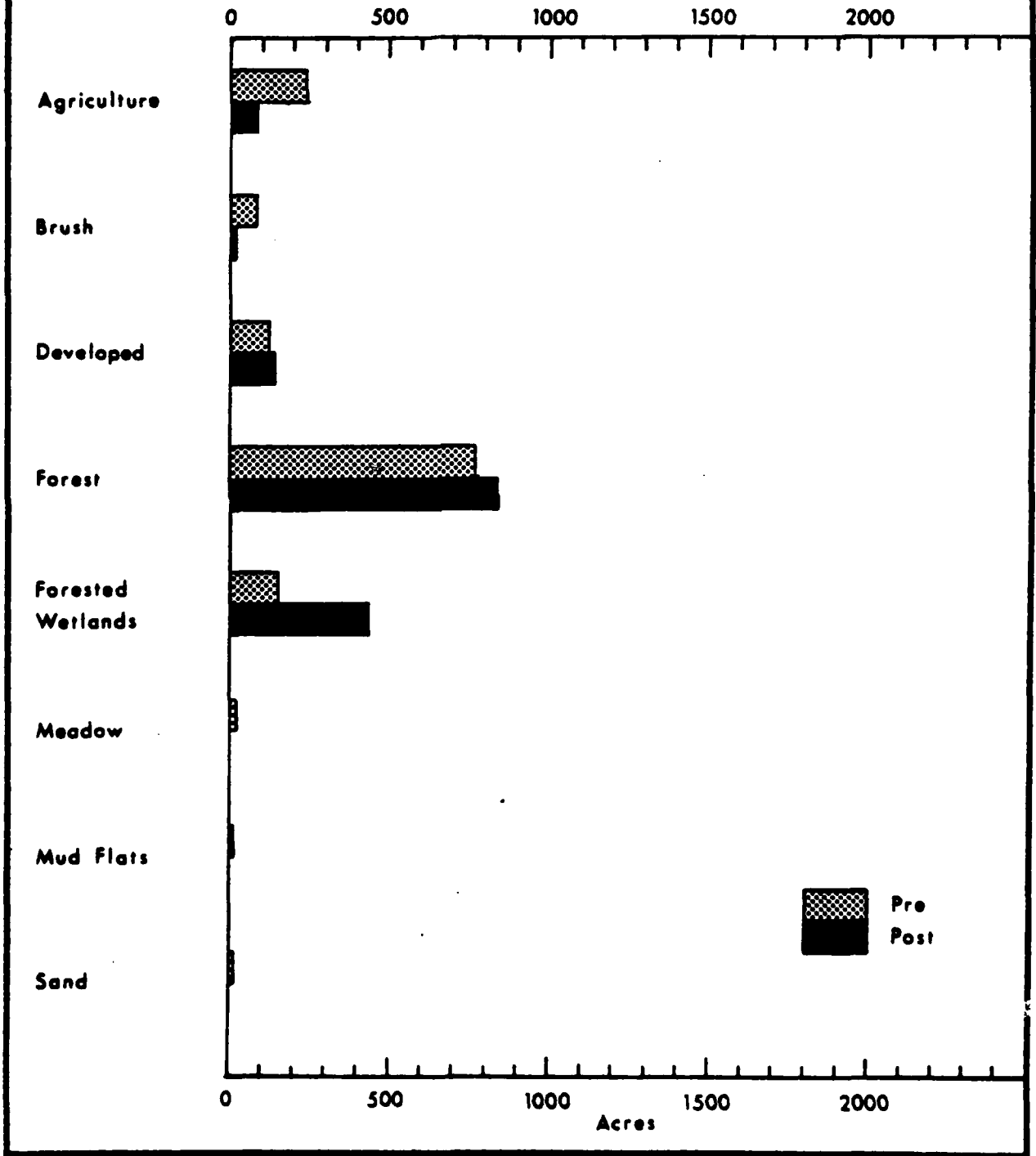


TERRESTRIAL HABITAT

Illinois River, Pool 26 -- Mile 65 to Mile 70

Pre and Post Impoundment

(1927-1936) & (1975-1977)

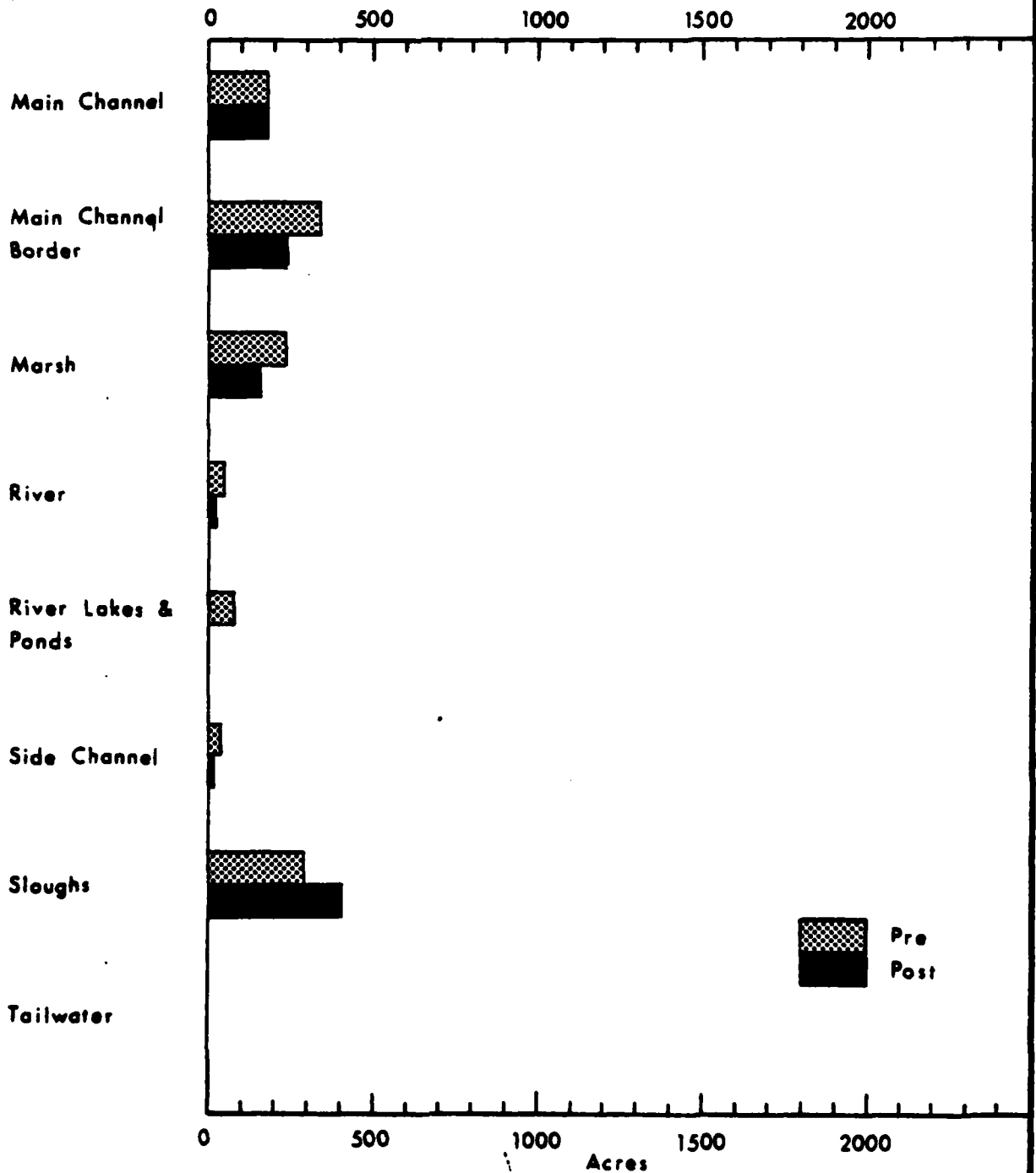


AQUATIC HABITAT

Illinois River, Pool 26 -- Mile 65 to Mile 70

Pre and Post Impoundment

(1927 - 1936) & (1975 - 1977)



TERRESTRIAL HABITAT

Illinois River, Pool 26 -- Mile 70 to Mile 75

Pre and Post Impoundment

(1927-1936) & (1975-1977)

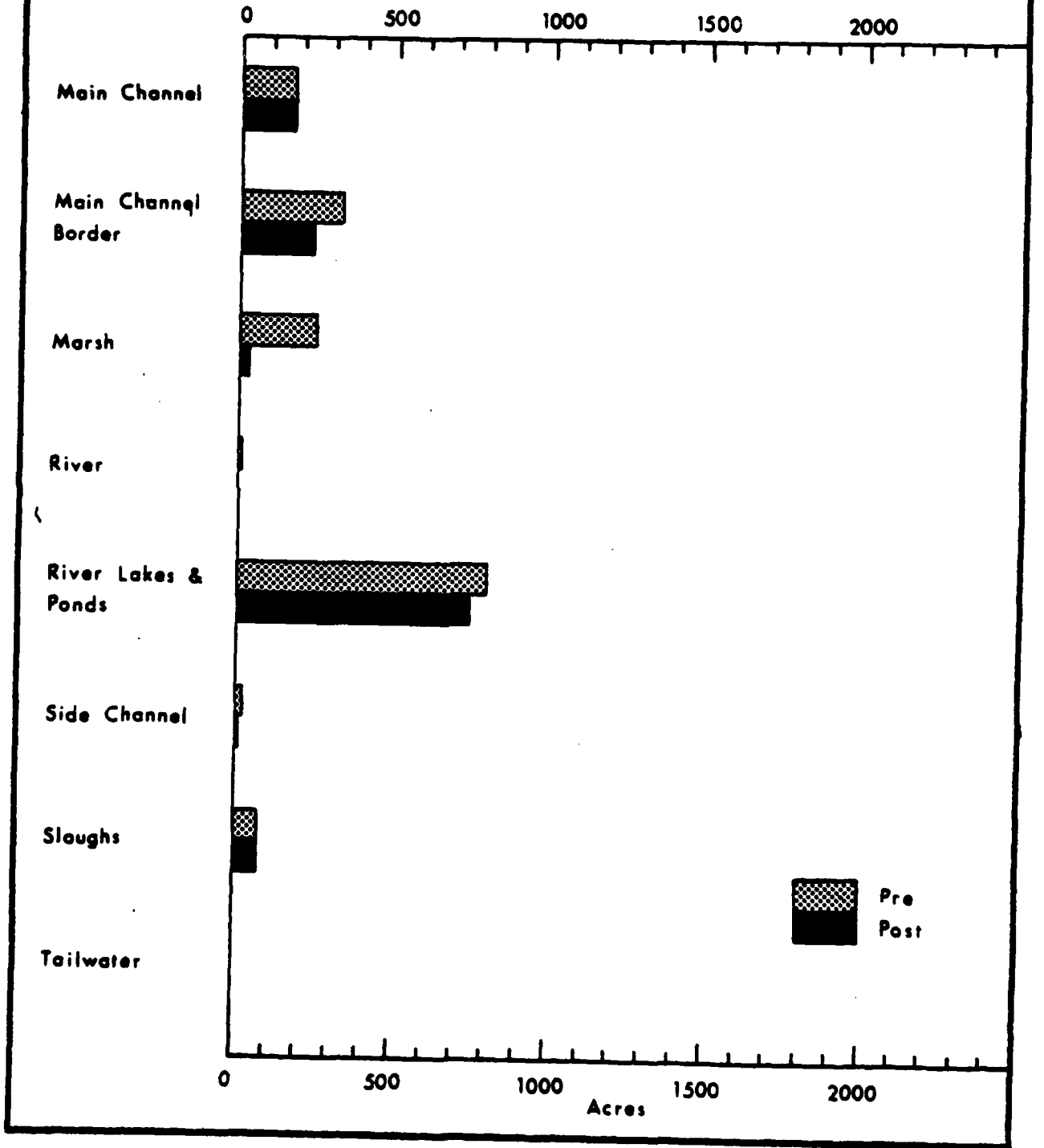


AQUATIC HABITAT

Illinois River, Pool 26 -- Mile 70 to Mile 75

Pre and Post Impoundment

(1927-1936) & (1975-1977)

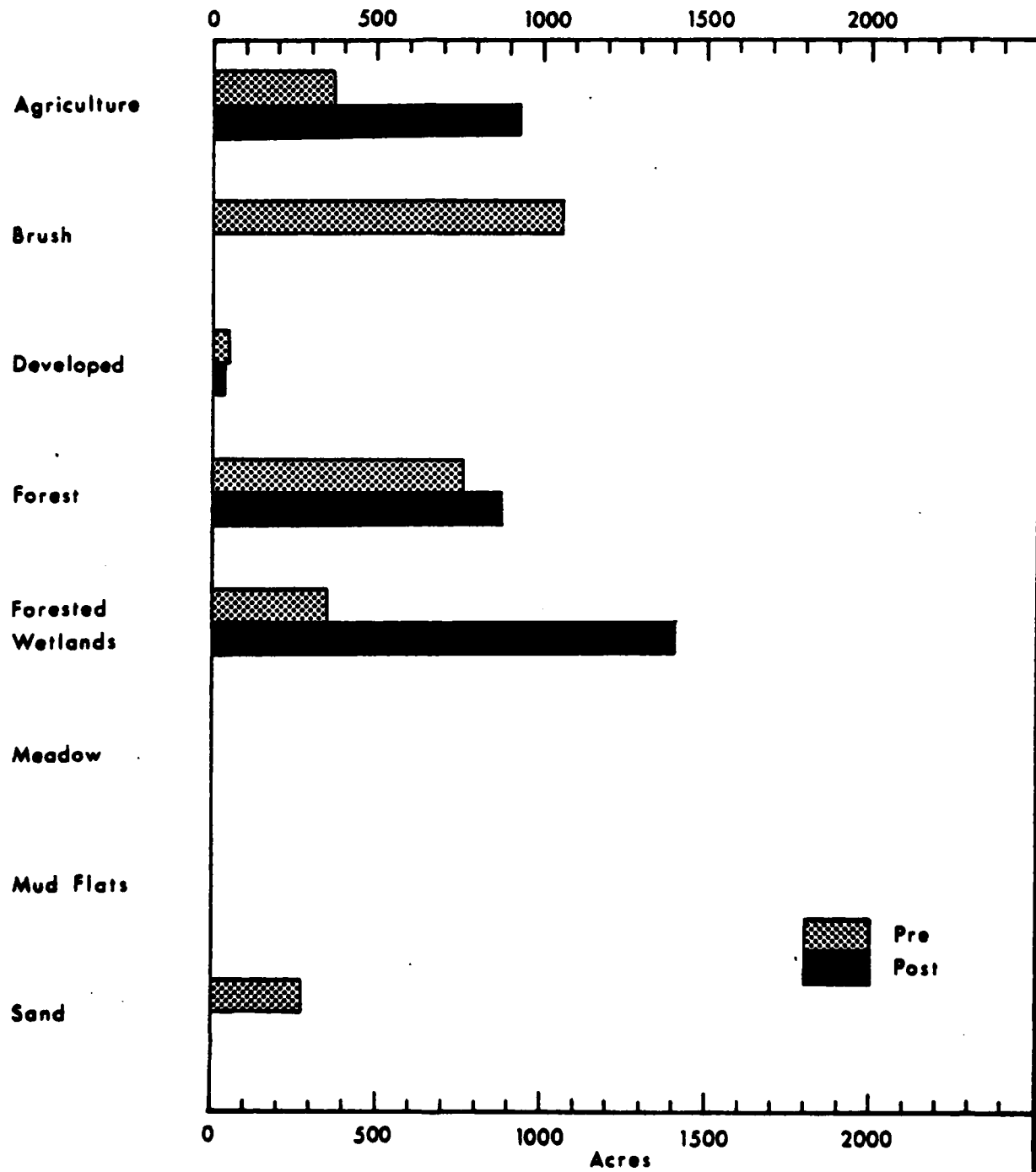


TERRESTRIAL HABITAT

Illinois River, Pool 26 -- Mile 75 to Mile 80

Pre and Post Impoundment

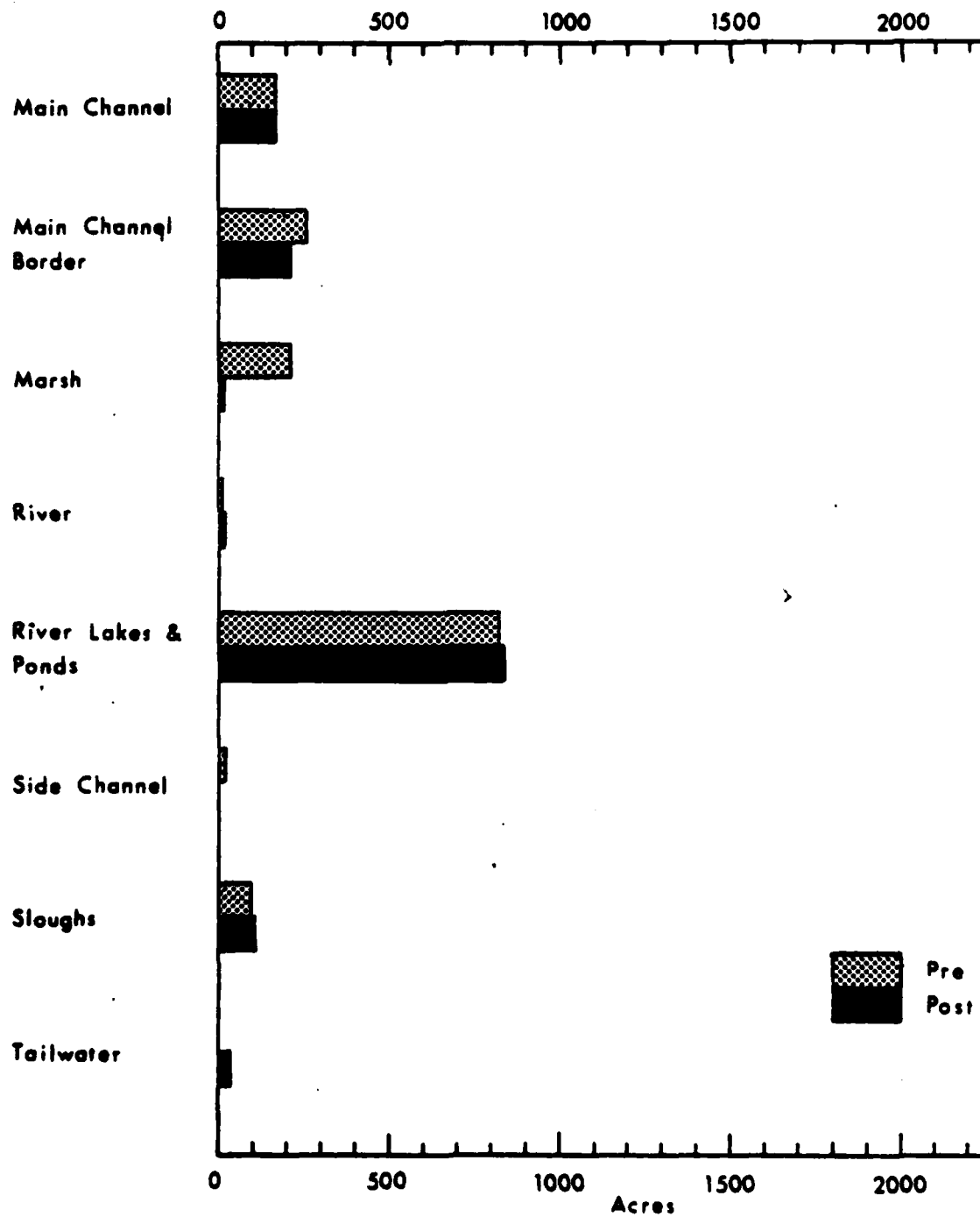
(1927-1936) & (1975-1977)



AQUATIC HABITAT

Illinois River, Pool 26 -- Mile 75 to Mile 80

Pre and Post Impoundment
(1927-1936) & (1975-1977)



END

FILMED

3-83

DTIC