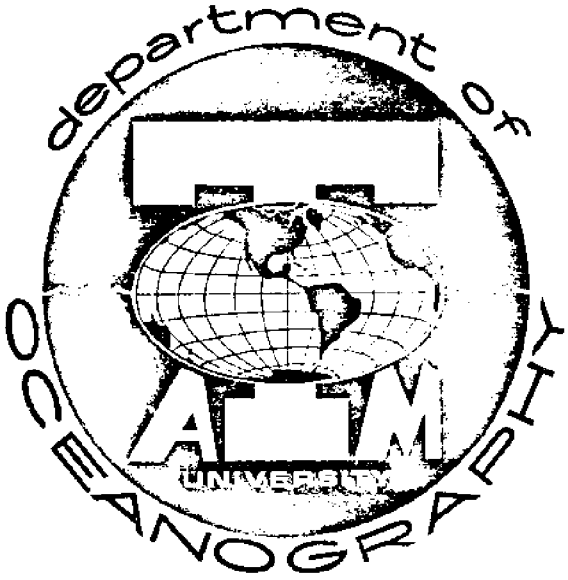

THE POST-GRADUATE FATE OF OCEANOGRAPHY MAJORS FROM TEXAS A&M UNIVERSITY

by

Worth D. Nowlin, Jr.

Reference 72-9-T

September 1972

The Texas A&M University

DEPARTMENT OF OCEANOGRAPHY

College Station, Texas

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ABSTRACT

As of August 1970, Texas A&M University had granted 111 MS and 72 PhD degrees in the field of Oceanography since the first degrees were earned in 1952. Responses regarding 94 MS and 63 PhD recipients were received to personal inquiries soliciting information concerning activities since graduation. The 18 alumni who received both graduate oceanography degrees from Texas A&M were considered only as PhD recipients.

The majority (61%) of the PhD recipients work at universities, where 48% are in faculty positions. In contrast, only 8 (11%) of the 74 living MS recipients are faculty, and 4 of them subsequently earned the PhD. More MS than PhD recipients are employed by government (37% vs 22%) and industry (24% vs 17%), principally as researchers. There is little difference between groups in frequency of job change since graduation (about one-third remain in Texas). The PhD group seems to have a better publication record than the Masters.

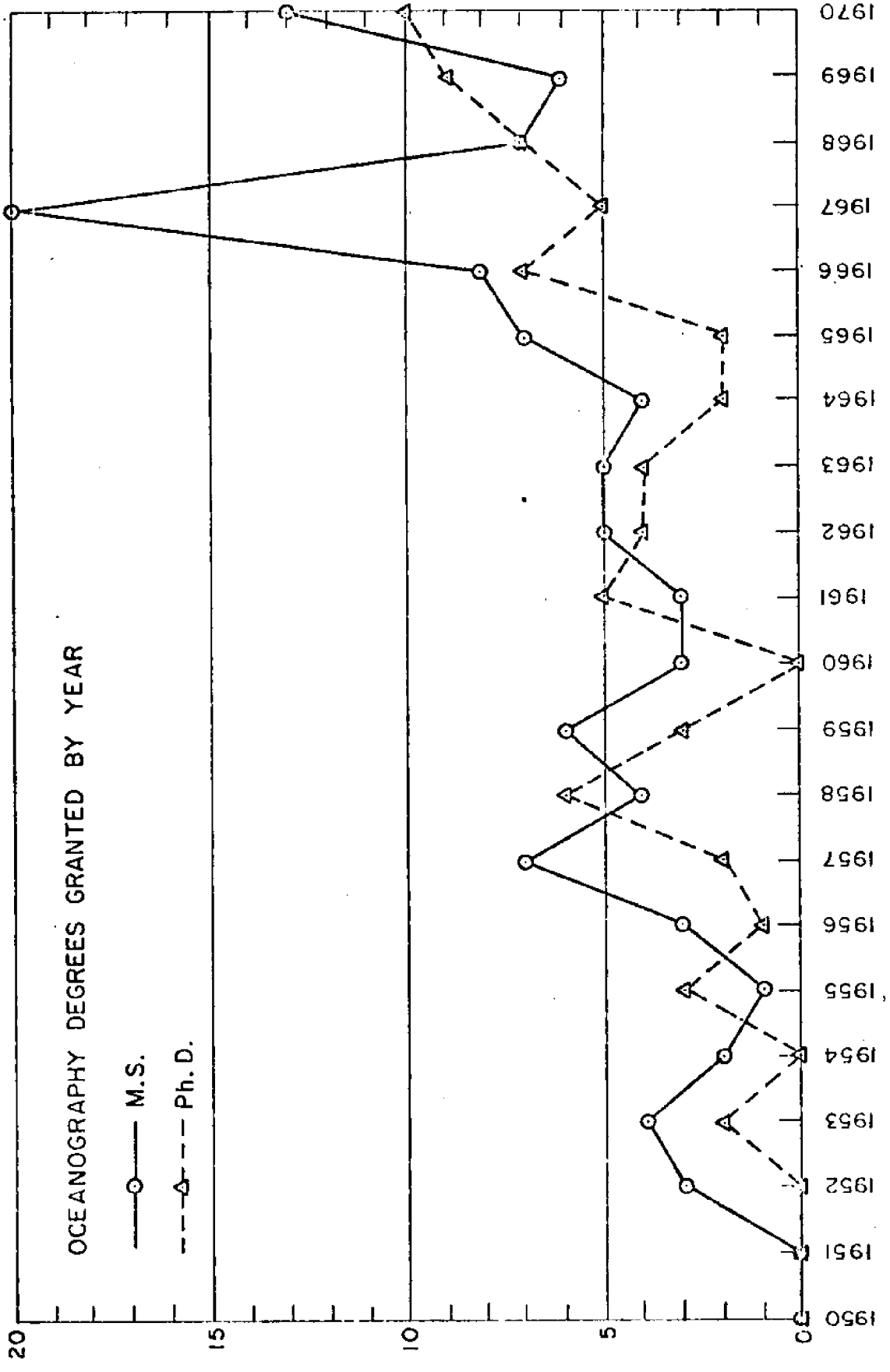
Of the living graduates, 78% of the MS and 84% of the PhD recipients have remained in ocean-related activities.

THE POST-GRADUATE FATE OF OCEANOGRAPHY MAJORS FROM TEXAS A&M UNIVERSITY

The Department of Oceanography of Texas A&M University has offered graduate instruction in oceanography since its establishment in 1949. The Department actually included both Oceanography and Meteorology from September 1956 to August 1964. Separate degrees were awarded students of the two disciplines, however, and only students of oceanography were considered in this study.

As of the end of the fall term in December 1970, students had earned 111 Master of Science (MS) and 72 Doctor of Philosophy (PhD) degrees in oceanography from the Department. In Figure 1 are plotted by year the numbers of degrees of each type granted. The arithmetical means for the twenty-one year period are 5.3 MS and 3.4 PhD recipients per year. Although considerable year-to-year variation is seen, the annual number of graduates has generally increased throughout the period. A linear trend may be envisaged to represent the increase of PhD recipients. The numbers of MS recipients seems to have increased annually except for the period 1957 through 1964. Such trends give about 10 MS and 8 PhD recipients per year at the present.

There are several reasons why it might be unwise to attach too much significance to that trend for MS recipients or to extrapolate it into the future. First, the increase in numbers of MS graduates during the period of 1965-67 when compared to the preceding period is due in considerable measure to a temporary influx of students from the U. S. Navy, either on active duty or on leave from the U. S. Naval Oceanographic



Degree recipients by year. Fig. 1

Office. During the mid-1960's the Navy found itself in the position of having too few officers with post-graduate oceanographic training, considering the number of billets requiring such training. A program was initiated to rapidly increase the oceanography program of the U. S. Naval Postgraduate School. In addition, a number of selected officers were sent to universities with existing oceanography programs. One employee of the U.S. Naval Oceanographic Office earned the MS in 1965, one naval officer in 1966, and five officers plus two civilian naval employees in 1967. It seems to the author that a second reason to be wary of extrapolating the trend for MS graduates is an increasing relative emphasis on PhD rather than MS candidates by the departmental faculty.

In Table I are shown the numbers of graduates in each degree option. Seventy of the 183 graduates (or 38%) selected the physical oceanography option. The remainder are almost equally divided between geological, chemical and biological options; only four students graduated in meteorological oceanography.

The numbers of graduates in each option has been examined on a year-by-year basis. At both the PhD and MS levels the relative increases in numbers are greatest for the physical option. The increase in geological graduates has been chiefly since 1964 at the MS level and only since 1966 at the PhD level. The rate of biological graduates has increased only at the MS level and since 1965. Rates of graduates in other options or during other periods don't seem to vary significantly. The four meteorological graduates received their degrees prior to 1963; the meteorological oceanography program is now largely dormant.

TABLE I

Degree Option Selected (Total 183)

	Physical	Geological	Chemical	Biological	Meteorological
PhD	26	16	15	13	2
MS	44	24	19	22	2
Total	70	40	34	35	4

In the fall of 1969, the author began an attempt to contact the departmental graduates in oceanography. To each graduate was sent a personal letter soliciting information regarding positions held and publications and reports written since graduation. Correct addresses for many graduates were unknown, and several inquiries were often needed before contact was established. Admittedly, in some cases it was not possible to ascertain whether or not the intended recipient ever received any correspondence. In other cases, graduates whose whereabouts were known failed to respond at first, and follow-up letters were sent--sometimes with success. Each recipient was assured that his record would remain confidential, although it was pointed out that a summary, such as this paper, would be prepared and distributed openly.

Responses were received regarding 94 MS and 63 PhD recipients. Of these, it was found that 2 MS graduates are deceased. The percentage response was therefore 85% and 88% for MS and PhD, respectively. Eighteen of the MS recipients subsequently received also the PhD from the Department. For this presentation, it was decided to consider only the terminal degree received from the Department. Therefore, statistics were based on

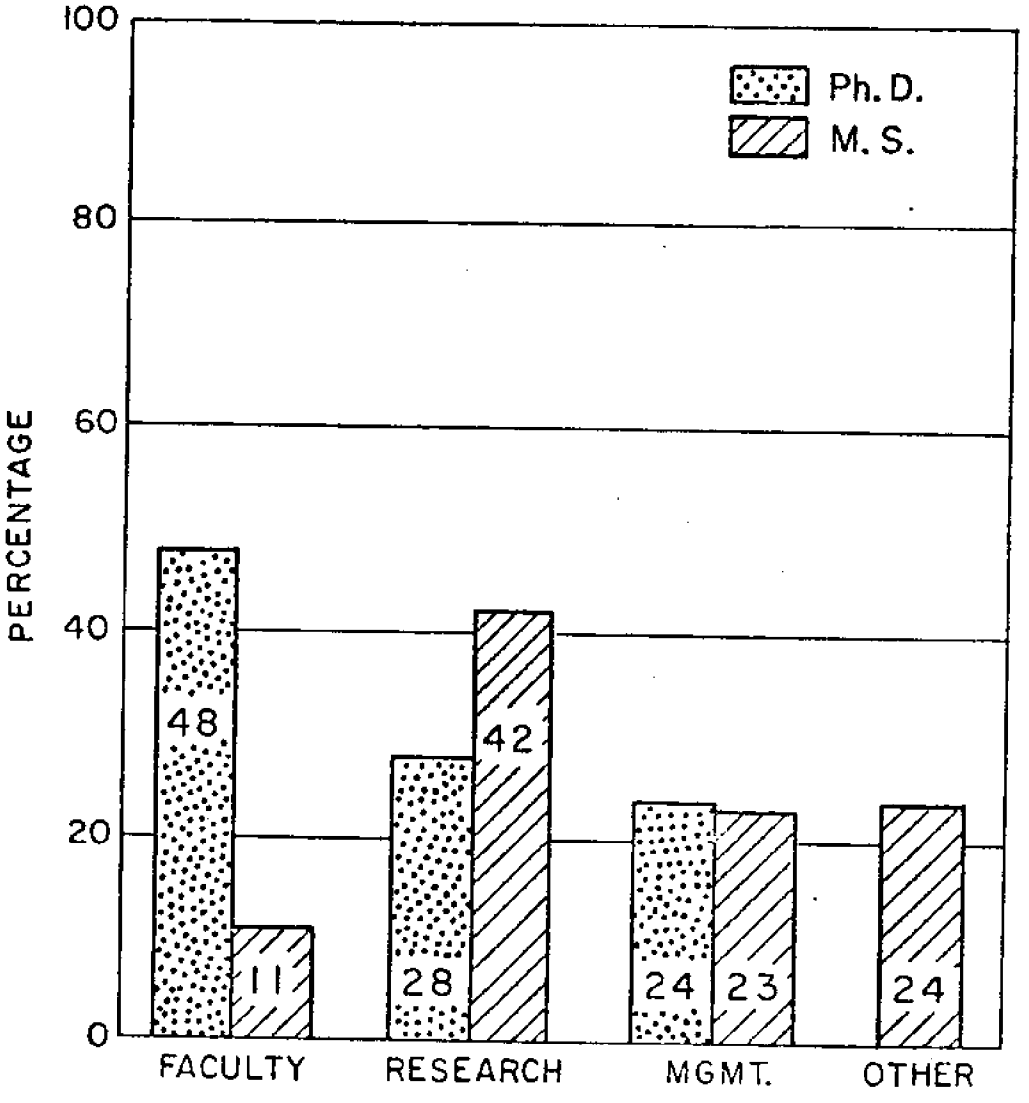
only 74 MS graduates, the number of living respondents who received only the Masters from the Department.

Based on responses received by August 1, 1971, data of the following classes were extracted from the responses and tabulated: number of positions held since graduation, type of present position, class of present employer, location of present employment, number of journal articles and books published since graduation, and number of technical reports and articles in unreferred publications issued since graduation. Manuscripts in press, published abstracts and talks presented were ignored.

The type of present employment was categorized as (1) faculty, (2) management and administration, (3) research or (4) other. Classified as faculty were those personally involved in teaching or student research direction in a faculty position at a college or university. Research scientists uninvolved with academic programs were categorized as research even if they were employed by and at a university. The category of "other" included positions such as students, pilots, farmers and unemployed.

Figure 2 shows the percentage of responding recipients presently employed by category. The pattern seems to be for PhD recipients to remain in faculty position (48%). In contrast to the PhD recipients, only 8 of the 74 living MS respondents (11%) are in faculty position, and 4 of them have subsequently earned the PhD.

Actually, 14 of the 74 MS recipients have gone on to complete the PhD outside the Department. Thirteen others are presently enrolled as full-time students working toward a higher degree. Ten are in the Department; three are at other institutions. Several other respondents indicate that they are pursuing further graduate study on a part-time basis. Of



Type of present employment. Fig. 2

the total 94 MS recipients heard from, 32(or 34%) have earned the PhD since completing the MS.

Of the PhD respondents, 61% are employed by colleges or universities, some in research positions. This is seen in Figure 3 which shows the percentage of responding graduates employed by each of the following classes of employers: (1) colleges and universities, (2) government, or (3) industry and not-for-profit institutions. Many more MS than PhD recipients are in strictly research positions. Consequently, higher percentages of MS recipients are employed by government and by industry or not-for-profit institutions. Table II gives more detailed information on the present

TABLE II

CLASSES OF EMPLOYERS

Government

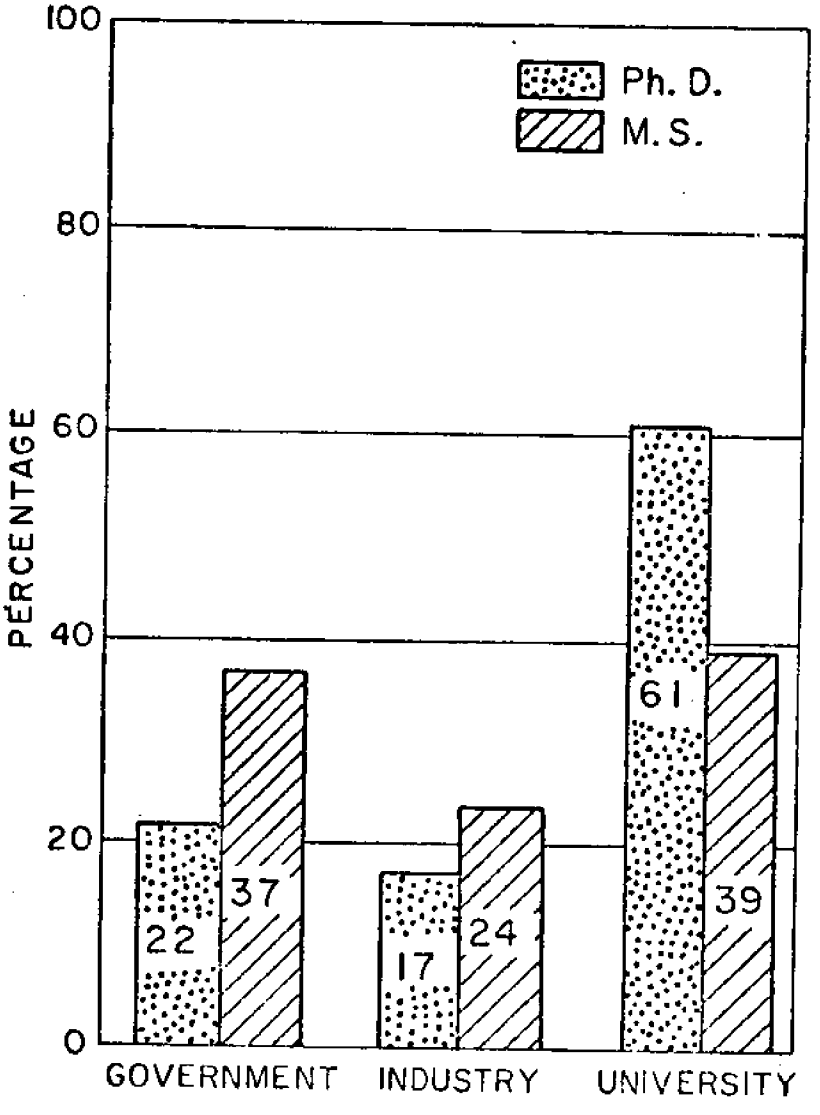
	U.S.A.						Foreign
	Navy	NOAA	NSF	NASA	Army	USCG	
MS	15	6	1	0	2	0	3
PhD	6	3	1	1	0	2	1

Industry

	Self Employed	Petro-Chemical	Aircraft	Electronic	Oceanographic Services	Un-Employed
MS	4	5	3	2	3	1
PhD	2	2	1	0	6	0

Academic

	Universities	Jr. Colleges
MS	28	1
PhD	38	0



Type of present employer. Fig. 3

employers of the responding graduates. The heavy use of oceanographers by the Navy is expected. Together with NOAA, the Navy accounts for most of these oceanographers employed by the Federal government. In the industrial class of employer the distribution between subdivisions is rather uniform. Self-employed included attorneys and ranchers as well as consultants.

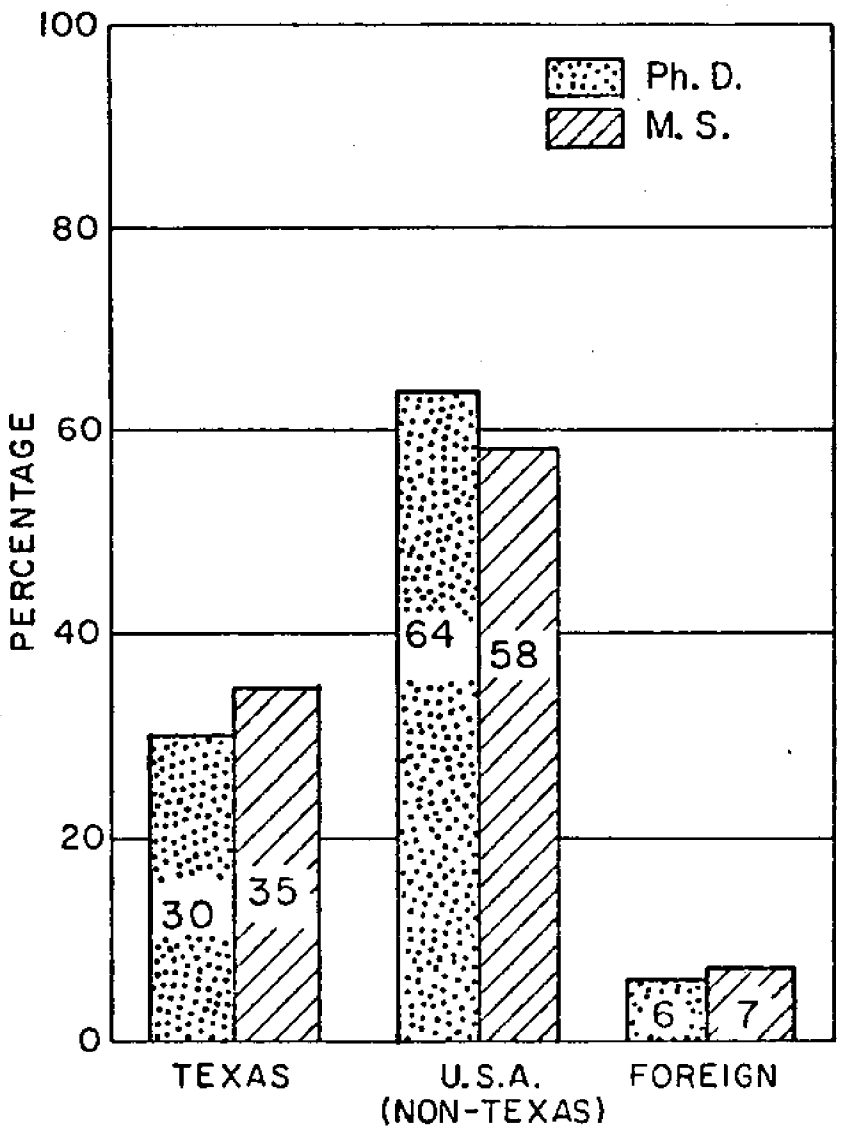
The present job locations of the responding graduates are shown in Figure 4. The author was pleasantly surprised to learn that over thirty percent of the graduates remain in Texas.

There seems little to distinguish MS from PhD recipients on the basis of number of positions held since graduation from the Department. However, this information is easily biased. If one includes all graduates the largest segment of graduates have held only one job. If one computes the average number of years per position held, this job longevity figure will be unrealistically low unless recent graduates are excluded from the listing. In Table III are presented the percentages of responding graduates who received their degrees prior to 1970 as a function of numbers of years per position held since graduation. Even omitting the most recent graduating class, the presentation is still biased in favor of shorter longevities.

TABLE III

Number of Years Per Position Held Since Graduation

	0-0.9	1.0-1.9	2.0-2.9	3.0-3.9	4.0-4.9	5.0-5.9	≥6
MS	0%	23%	27%	23%	13%	8%	6%
PhD	2%	27%	18%	17%	13%	6%	17%



Location of present employment Fig. 4

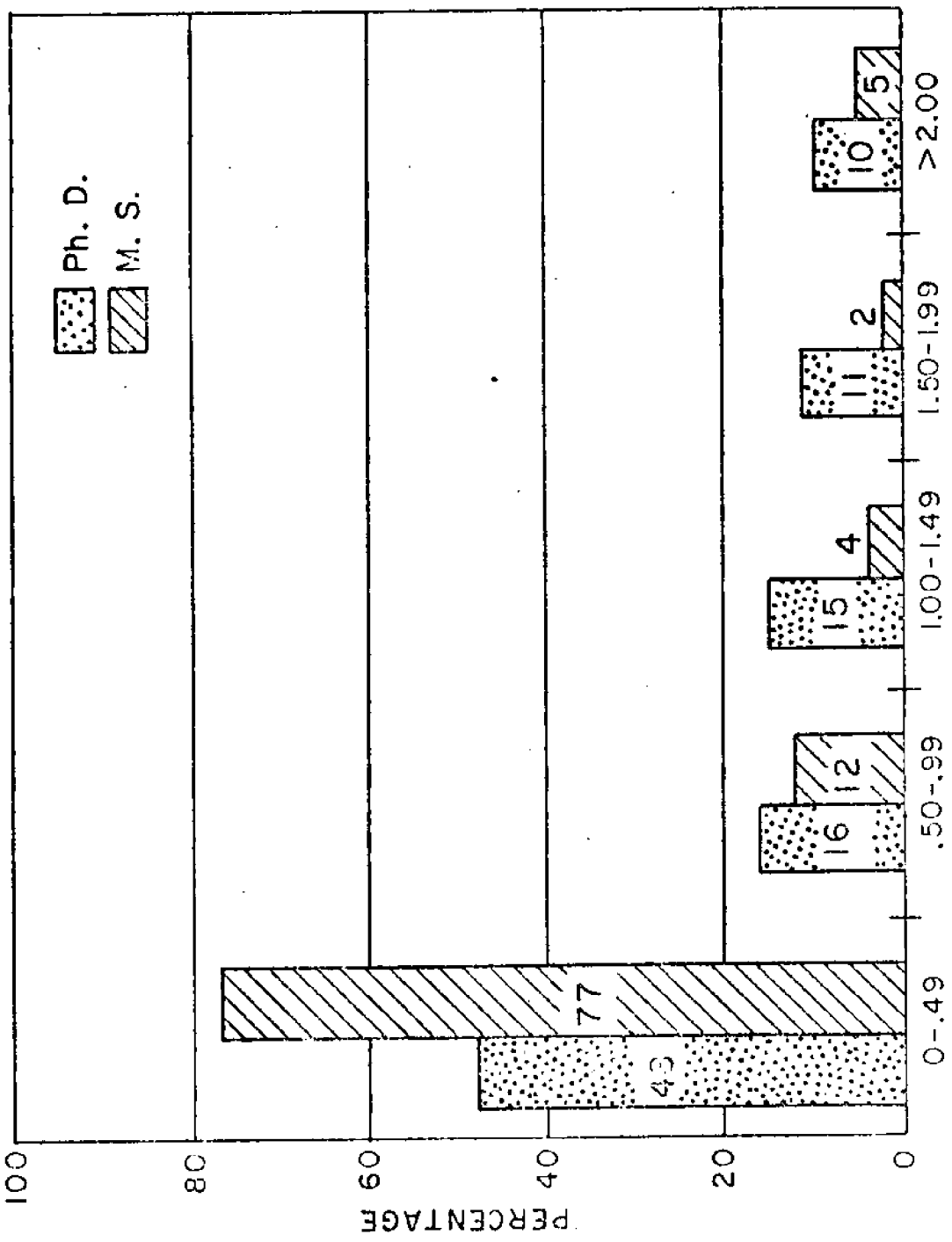
Figure 5 is a histogram indicating the numbers of publications per year since graduation from Texas A&M. Casual inspection leads one to surmise that the PhD's have a better publication record than do the Masters. But, it should be remembered that of these 74 MS holders, 13 are still enrolled as full-time students.

If publication records of PhD recipients are subdivided on the basis of present type of employment, the average number of publications per year since graduation is between 0.75 to 0.85 for each class (management, faculty, research). However, if histograms are prepared for each of these classes (Table IV), faculty seem to have the best record as a class. It is also true for MS recipients that faculty have the best publication record. In fact, for MS graduates the average publication rate is 0.79 papers per year for faculty, but only 0.48, 0.30 and 0.11, respectively, for research, management and other classes of employment.

TABLE IV

Number of Publications Per Year Since Graduation

		0-0.49	.50-.99	1.00-1.49	1.50-1.99	≥2.0
PhD	Faculty	48%	10%	17%	18%	7%
	Management	60%	40%	20%	8%	7%
	Research	56%	16%	6%	6%	16%
MS	Faculty	50%	25%	13%	0%	12%
	Management	82%	6%	6%	6%	0%
	Research	76%	10%	4%	0%	10%
	Other	89%	11%	0%	0%	0%



Number of publications per year since graduation from Texas A & M. Fig. 5

The data on numbers of reports issued per year since graduation (presented in Table V) do not show a notable difference between the reporting record of MS and PhD recipients. It can be argued (and has been by reviewers of this paper) that it is unfair to some groups, particularly to administrators, not to consider abstracts and talks presented as part of their record of productivity. Such data were not requested as part of my survey information however.

TABLE V

Number of Reports Issued Per Year Since Graduation

	0-0.49	0.50-0.99	1.00-1.49	1.50-1.99	$\geq$2.0
MS	67%	16%	12%	0%	5%
PhD	54%	22%	10%	5%	9%

Publication records were compared also on the basis of employer, i.e., academy, government, industry. This comparison is given as Table VI. Those MS recipients presently pursuing full-time graduate studies were omitted since their publication rates were very low (0.12 publications/year and 0.08 technical reports/year since graduation).

TABLE VI

Average Number of Publications and Reports Per Year Since Graduation

	University	Government	Industry	University	Government	Industry
PhD	.83	1.07	.29	.61	.69	.52
MS	.77	.34	.27	.38	.56	.49

The employees of the industrial segment seem to publish considerably less in the open literature than those of the academic or governmental segments. This may be caused by the necessity for the industrial segment to retain many new research results as confidential. A few respondants reported only the numbers of reports issued, since apparently even some titles were confidential. (Note that the low publication rate for government-employed Master's recipients is partly because active duty naval officers were included in this group.) From Table VI it is seen that there is not much difference in the report issuance rate of respondants, either by degree or by class of employer.

A key question is "how many graduates have remained in ocean-related activities?" Of the 74 living MS respondants who received only their masters from this Department, 58 (or 78%) should be considered to be in ocean-related activities in this author's opinion. (See Table VII.) Of the 63 responding PhD recipients, 84% (all except 10) were so employed.

TABLE VII

	Ocean Related					Non-Ocean-Related		
	Oceanography Students	Active USN	Sea Grant	Oceanology	Environmental Sciences	Research & Engineering	Teaching	Other
MS	13	4	2	36	3	8	2	6
PhD	0	1	1	38	13	7	3	0

In ocean-related activities, I included graduates pursuing further oceanographic graduate study, officers on duty in the U. S. Navy, and those involved in environmental monitoring and study (from fisheries to meteorology), as well as those involved directly in sea grant programs, oceanographic equipment sales, or in study, exploration or exploitation of the oceans (oceanology). As non-ocean-related are counted graduates in teaching, research or engineering not related to the oceans, as well as those graduates who turned to distinctly different professions, such as insurance, farming, flying, the law, etc. It is interesting to note that no reporting PhD recipient was classified as having entered a distinctly different profession.

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