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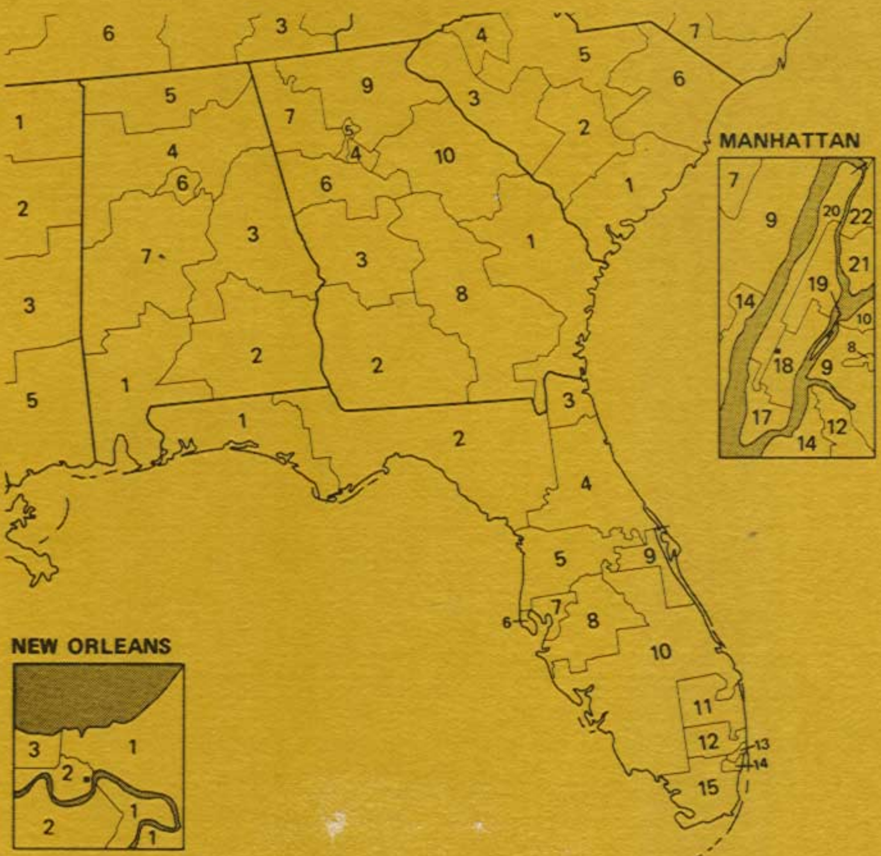

The Florida Geographer is the official publication of the Florida Society of Geographers, and is distributed without cost to members of the Society. One number per year will be published, pending receipt of an adequate number of acceptable manuscripts.

The Florida Geographer is a state-wide journal, with broad coverage of geographical topics relating to the state and its several regions. No restrictions are placed on the content of articles, providing that they deal with some aspect of the geography of Florida, i.e., local studies within the state, matters of the state generally, or studies of the U.S. South, of which Florida is a part.

Manuscripts are solicited from all who feel they have research worthy of dissemination. No specific format requirements are presently in force, although the editor would prefer manuscripts to be typed double-spaced following the general format of the articles in the present number. However, authors should not be dissuaded from submitting manuscripts because of format considerations; the editor is willing to undertake extensive revisions. As this number demonstrates, we are able to reproduce maps, charts, and tables.

We would like to publish an original map on the cover of each number, so a special request is made to all who have maps of the state or regions of the state which would be of interest to the Society's membership.

David Lee
Editor, *The Florida Geographer*
Department of Geography
Florida Atlantic University
Boca Raton, FL 33431

About the Cover ...

The Florida Geographer does not regularly feature book reviews. However, when The Free Press gratuitously sent *The Historical Atlas of United States Congressional Districts: 1789-1983* (a one hundred-fifty dollar book) we felt compelled to print a review of it. The cover of this *FG* shows a detail of the map showing the Congressional Districts of The Ninety-seventh Congress, page 215 of *The Historical Atlas of United States Congressional Districts: 1789-1983* edited by K. C. Martis and R. A. Rowels. The map was reprinted by permission of the Free Press, A Division of Macmillan Publishing Company, Inc., copyright © 1982. This volume is reviewed on page 11 below.

Also, we welcome for the first time a new cover masthead, designed by Paul R. Stayert of the University of Florida. Many thanks to him for his contribution.

THE FLORIDA GEOGRAPHER

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CONTENTS

CHANGES IN MARITIME TRAFFIC OF

THE PORT OF JACKSONVILLE

Bruce E. Marti

This paper falls within the subfield of port geography. Its purpose is to measure relative and absolute change in Jacksonville's maritime traffic from 1974 through 1980. Changes are described in the context of the Northeast Florida/Georgia region, which includes the ports of Jacksonville in Florida and Savannah and Brunswick in Georgia. Interport competition among these regional ports has been increasing, and information concerning throughput trends will become essential for port planning decisions.

According to Oram (1965, p. 1), the main function of a modern port is to serve as a gateway to an industrial hinterland to provide an outlet for its products and an inlet for the raw materials it needs. Weigend (1958, p. 185) defines a port as the place of contact between land and maritime space providing service to both hinterland and maritime organization. A hinterland can be described as organized and developed land space which is connected with a port by means of transport lines and which receives or ships goods through that port. Hinterland areal overlap occurs where there is competition between ports of comparable size for cargo of the same type to and from the same area (Bird 1971, pp. 124-25). It is assumed that hinterland areal overlap existed among the three study ports. Jacksonville's cargo data were examined in this light.

Data

All United States ports compile cargo statistics. However for comparative analyses suspicion arises because a uniform methodology of data collection and reporting does not exist and individual ports emphasize particular types of data.

The data analyzed here were taken from the records of the U.S. Army Corps and Engineers' Waterborne Commerce of the United States (1974 and 1980), and the U.S. Department of Commerce, Maritime Administration's MARAD Containerized Foreign Trade Data (1974 and 1980). The first data source provides traffic information by Standard Industrial Classification (SIC) for all U.S. ports, and the second reports international containerized movements originating or terminating in domestic ports.

Methodology

This investigation of the Northeast Florida/Georgia region is in two parts. First, the import cargo and export cargo by two-digit SIC codes were examined. Second, containerized cargo to and from the region were surveyed. Two indicies, an index of concentration and a location quotient, were applied to both types of cargo flows.

Index of Concentration

An index of concentration has been suggested as a valid method of translating relative time series data to absolute terms (Lowe and Moryadas 1975, p. 167). It defines the cargo which should have been handled at an individual port assuming the port's growth rate was the same as the region's. Differences between the actual and hypothetical tonnage were calculated as follows:

$$H_j = X_j * Y_{nfg} / X_{nfg}$$

where

H_j = hypothetical tonnage of Jacksonville

X_j = tonnage of Jacksonville in initial year

X_{nfg} = tonnage of Northeast Florida/Georgia in initial year

Y_{nfg} = tonnage of Northeast Florida/Georgia in terminal year

Y_j = tonnage of Jacksonville in terminal year.

$Y_j - H_j$ = comparative gain or loss

The index of concentration makes more meaningful the progression of the commodity tonnage throughput of a single port over time.

TABLE 1

STUDY AREA FOREIGN WATERBORNE COMMERCE
(WEIGHT IN SHORT TONS)

PORT	1974	1980
Jacksonville		
Imports	5,328,990	3,039,929
Exports	1,707,452	3,137,260
Total	7,036,442	6,177,189
Savannah		
Imports	4,251,970	4,202,760
Exports	1,981,240	4,863,722
Total	6,233,210	9,066,482
Brunswick		
Imports	1,155,445	950,295
Exports	38,123	139,973
Total	1,193,568	1,090,268
Regional Total		
Imports	10,736,405	8,192,984
Exports	3,726,815	8,140,955
Total	14,463,220	16,333,939

Source: Waterborne Commerce of the United States, U.S. Corps of Engineers, Part 1, 1974 and 1980.

The location quotient, referred to as a retio of ratios, is a measurement of the relative importance of one phenomenon when compared to a larger entity. This statistic, applied to port traffic, may be regarded as an index of the characteristics of an individual port compared to a larger region (Rimmer 1965, pp. 65-66).

The formula for calculating the location quotient is:

$$LQ_c = \frac{\dfrac{T_{cj}}{TT_j}}{\dfrac{T_{cnfg}}{TT_{nfg}}} * 100$$

where

LQ_c = iocation quotent for commodity c

T_{cj} = tonnage of commodity c in Jacksonviiie

TT_j = total tonnage in Jacksonville

T_{cnfg} = tonnage of commodity c in Northeest Florida/Georgia

TT_{nfg} = total tonnage in Northeast Florida/Geogria

Location quotients permit the researcher to distinguish commodities which are under-represented (location quotients less than 100) or over represented (location quotients greater than 100). Thus traffic specialization can be recognized.

A word of caution should be mentioned, however. When interpreting the results of the location quotient analyses, the researcher shouid exercise caution because statistics will be in relative mmbers. Herein lies the major weakness of the analyses, since equal weight may be apportioned to both large and smail movements in different sectors.

Commodity Analysis

Jacksonville's tonnage over the study period grew at a slower rate than that of the Northeast Florida/Georgia region. In 1974, Jacksonville handled 7,036,442 totai short tons, or almost 49 percent of the ragion's tonnage; while by 1980 tonnage decreased to 6,177,189 short tons, or approximately 38 percent of the region's handle (Table 1).

The port'a decline, however, did not occur in all commodity sectora. An analysis of the indicies of concentration (ICs), for both imports and exports by commodity revealed respective strengths and weaknesses. Commodity sector codes for use with subsequent tables may be found in Table 2.

TABLE 2

COMMODITY SECTORS

Sector	Commodity Type
1	Agricultural Products - Crops
8	Forest Products
9	Fishing, Hunting, and Trapping Products
10	Metallic Ores
11	Coal and Lignite
13	Crude Oil and Gas
14	Nonmetallic Minerals
19	Ordnance and Accessories
20	Food and Kindred Products
21	Tobacco Products
22	Textile Mill Products
23	Apparel and Other Finished Products Made From Fabrics and Similar Materials
24	Lumber and Wood Products, Except Furniture
25	Furniture and Fixtures
26	Paper and Allied Products
27	Printed Products
28	Chemicals and Allied Products
29	Refined Petroleum and Related Products
30	Rubber and Miscellaneous Plastics Products
31	Leather and Leather Products
32	Stone, Clay, Glass, and Concrete Products
33	Primary Metal Products
34	Fabricated Metal Products, Except Ordnance, Machinery, and Transportation Equipment
35	Machinery, Except Electrical
36	Electrical Machinery, Equipment, and Supplies
37	Transportation Equipment
38	Professional, Scientific, and Controlling Instruments, Photographic, and Optical Goods, Watches, and Clocks
39	Miscellaneous Manufacturers
40	Scrap and Wastes
41	Other
99	Defense and SCI

Index of Concentrations

An examination of Table 3 reveals that nine imported commodities experienced a comparative gain or losss greater than 10,000 short tons when hypothetical tonnage was compared to actual tonnage for 1980. Greatest gains were in transportetion equipment (36,890) and nonmetallic minerels (14,707). The principal commodity classificetion contributing to high actual yields in transport receipts waa motor vehicles, parts, and equipment. Increases in motor vehiclea reflected the fact thet Jacksonville was the major import center for foreign built automobiles in the Soutt Atlantic port range. Unworked building atone was the key item included in tha category of nonmetallic minerals.

Large inbound losses were in refined petroleum and related products (-535,348), chemicals and allied products (-97,092), primary metal products (-77,043), lumber and wood products (-38,041), metallic ores (-17,801), crude oil and gas (-12,531), and stone, clay, glass and concrete products (-10,420). Declines in refined petroleum, crude oil, and gas were probably stimulated by national trends encouraging energy conservation and self-sufficiency. Other consequential aberations incurred as a result of the international economic recession which inhibited trade.

Exports originating at Jacksonville fared slightly better than did imports (Table 4). Nine SICs acquired a comparative gain or loss exceeding 10,000 short tons. Gains were achieved in chemicals and allied products (405,790), food and kindred products (32,466), paper and allied products (197,361), transportation equipment (22,082), and fabricated metal products (13,225). The primary chemical product shipped included potassic chemicals and other fertilizers. Although many food products were handled, prepered fruit and vegetable juice dominated exports, while in the category of paper an allied products, paper and paperboard were the primary commodity moved. Similar to

TABLE 3

INDEX OF CONCENTRATION FOR JACKSONVILLE'S IMPORTS
(WEIGHT IN SHORT TONS)

SIC	ACTUAL TONNAGE 1974	ACTUAL TONNAGE 1980	HYPOTHETICAL TONNAGE	COMPARATIVE GAIN OR LOSS
1	100,962	91,890	97,777	-5,887
8	58	3,135	101	3,034
9	628	544	2,846	-2,302
10	39,136	329	18,130	-17,801
11	0	13	---	---
13	20,351	0	12,531	-12,531
14	662,213	656,280	641,573	14,707
19	0	13	0	13
20	20,649	58,366	55,004	3,362
21	42	2	32	-30
22	4,849	2,298	3,358	-1,060
23	128	369	218	151
24	311,844	33,605	71,646	-38,041
25	751	1,225	3,263	-2,038
26	0	519	0	519
27	10,295	288	795	-507
28	57,230	24,707	121,799	-97,092
29	3,329,771	1,600,401	2,135,749	-535,348
30	1,711	7,865	2,739	5,126
31	707	298	1,250	-952
32	267,012	45,914	56,334	-10,420
33	265,469	43,204	120,247	-77,043
34	8,085	6,310	10,757	-4,447
35	12,891	18,589	16,610	1,979
36	1,058	3,379	3,231	148
37	209,522	436,570	399,590	36,890
38	37	347	113	234
39	946	1,576	2,809	-1,233
40	113	0	260	-260
41	2,532	1,893	2,049	-156
99	0	0	---	---

Source: Waterborne Commerce of the United States, U.S. Corps of Engineers, Part 1, 1974 and 1980, and Author's calculations.

TABLE 4

INDEX OF CONCENTRATION FOR JACKSONVILLE'S EXPORTS
(WEIGHT IN SHORT TONS)

SIC	ACTUAL TONNAGE 1974	ACTUAL TONNAGE 1980	HYPOTHETICAL TONNAGE	COMPARATIVE GAIN OR LOSS
1	15,833	74,979	132,207	-57,228
8	19	403	93	310
9	74	40	673	-633
10	4,364	77	228	-151
11	0	0	---	---
13	0	0	---	---
14	1,162,065	1,328,303	1,639,505	-311,202
19	0	2	---	---
20	24,709	60,550	28,084	32,466
21	59	686	288	398
22	1,193	6,177	4,029	2,148
23	68	1,250	246	1,004
24	8,728	15,798	172,205	-158,407
25	312	539	2,136	-1,597
26	28,962	253,516	56,155	197,361
27	227,814	148	620	-472
28	153,405	1,251,494	845,704	405,790
29	1,755	283	2,828	-2,545
30	194	2,732	1,129	1,603
31	23	70	353	-283
32	1,718	4,269	3,947	322
33	5,253	37,650	30,678	6,972
34	1,053	15,429	2,204	13,225
35	2,316	8,035	1,630	6,405
36	311	6,205	3,398	2,807
37	800	23,886	1,804	22,082
38	181	207	347	-140
39	47	510	205	305
40	66,109	43,696	84,299	-40,603
41	3	212	267	-55
99	84	114	280	-166

Source: Waterborne Commerce of the United States, U.S. Corps of Engineers, Part 1, 1974 and 1980 and Author's calculations.

gains in imports, exports of transport equipment relied heavily on motor vehicles, parts and equipment. However, the data for fabricated metal products were not disaggregated into specific types. Gains in exports, therefore, mostly represented regional or localized products.

The four export SICs that displayed the largest losses were nonmetallic minerals (-311,202), lumber and wood products (-158,407), agricultural products (-57,228), and scrap and wastes (-40,603). Losses were attributable to a combination of two factors--the general slowdown of the world economy and competition from other regional port facilities.

The preceeding comparative gain or loss information highlighted commodity sectors which grew at a faster or slower rate in Jacksonville compared to the region as a whole. Major gains or losses predominantly fell into the bulk or neobulk class of cargo. Bulk cargoes ara those usually carried in homogenous shiploads. While neobulk cargoes are comparable, they are usually hauled on purpose-built tonnage owned or chartered by industrial corporations.

Location Quotients

It is imperative to draw distinctions between the location quotient technique and the previously employed index of concentration procedure. While the earlier methodology could measure change over time and reported statistics in absolute numbers, it also possessed inherent weaknesses. A principel shortcoming was that the researcher had to define the initial and terminal study years. The choice of the time span could bias the investigation. Moreover, there was no assurance that the period covered was indicative of long-term trends, thus, assertions about change at the port were, at best, time specific. Some of these potential partialities were ameliorated by utilizing the location quotient, since this approach measured change only after the computation of location quotients for each respective year.

An examination of Table 5 shows that Jacksonville fared better than the North Florida/Georgia region by 50 percent or more (LQs greater than, or equal

TABLE 5

LOCATION QUOTIENTS FOR JACKSONVILLE'S INTERNATIONAL TRADE

	IMPORTS			EXPORTS		
SIC	1974	1980	CHANGE	1974	1980	CHANGE
1	197.945	248.852	50.907	37.413	25.225	-12.188
8	0.359	14.918	14.559	11.520	59.665	48.145
9	60.567	15.487	-45.080	159.919	11.295	-148.624
10	46.025	1.117	-44.908	87.155	34.993	52.162
11	---	269.512	---	---	0.000	---
13	4.392	0.000	-4.392	---	---	---
14	69.218	94.716	25.498	138.906	133.795	-5.111
19	0.000	23.998	23.998	---	2.085	---
20	40.959	58.140	17.181	26.054	66.784	40.730
21	104.467	8.694	-95.773	73.169	206.991	133.822
22	5.357	4.904	-0.453	9.434	17.195	7.761
23	3.188	7.203	4.015	23.862	144.163	120.301
24	150.611	94.500	-56.111	44.083	4.753	-39.330
25	47.625	23.919	-23.706	194.570	58.375	-136.195
26	0.000	2.879	2.879	9.133	49.018	39.885
27	200.285	97.024	-103.261	218.225	61.943	-156.282
28	49.351	13.392	-35.959	103.326	181.784	78.458
29	134.703	135.027	0.324	155.085	18.451	-136.634
30	23.061	88.569	65.508	25.280	72.756	47.476
31	28.284	9.020	-19.264	83.669	19.701	-63.968
32	161.001	175.536	14.535	32.171	41.364	9.193
33	62.574	30.075	-32.499	66.413	96.904	30.491
34	26.164	20.530	-5.634	15.594	129.784	114.190
35	52.209	78.163	25.954	8.002	47.007	39.005
36	27.282	38.165	10.883	32.730	71.057	38.327
37	169.748	248.090	78.342	11.387	179.259	167.972
38	14.999	61.486	46.487	64.238	45.560	-18.678
39	31.487	23.633	-7.854	28.029	83.025	54.996
40	0.616	0.000	-0.616	99.863	61.541	-38.322
41	104.022	128.575	24.553	43.654	41.146	-2.508
99	0.000	---	---	76.077	36.840	-39.237

Source: Waterborne Commerce of the United States, U.S. Corps of Engineers, Part 1, 1974 and 1980, and Author's calculations.

to 150) for imports in five categories in 1974 and in four categories in 1980. During the initial year, printed products, agricultural products, transportation equipment, stone, glass, clay, and concrete products, and lumber and wood products were highly overrepresented. However, by 1980, coal and lignite was over-represented, and printed products dropped out of the premier designation. The greatest positive change for import LQs occurred in transportation equipment, rubber and plastic products, and agricultural products. Large negative change was recorded in printed products, tobacco products, and lumber and wood products.

Export location quotients greater than 150 in 1974 existed in four SIC categories--printed products, furniture and fixtures, fishing, hunting, and trapping products, and refined petroleum and related products. By 1980, only three commodity sectors registered LQs greater than 150--tobacco products, chemicals and allied products, and transportetion equipment. With the exception of transport equipment, all sectors recording a LQ greater than 150 in 1980 did not occupy a similar status in 1974. In addition to transport equipment, the greatest gaine (in decreasing order of importance), were in tobacco products, apparel, fabricated metal products, chemicala and allied products, miscellaneous manufacturers, and metallic ores.

Container Analyses

The international container information utilized in this research recorded only movements of boxes with cargo, therefora, no discussion of empties was included. Statistics for both years examined reported tonnage in long tons (2,240 lbs.). To provide compatability with tha commodity analyses all tonnage figures were converted to short tons (2,000 lbs.) by multiplying by a 1.12 factor.

In addition, the Maritime Administration updated its data reporting scheme over the study pariod. During the initial period, MARAD's container figures were in number of units without regard to size. Thus, equal weighting was given both to twenty-foot boxes and forty-foot boxes. This disparity was later remedied by reporting unita in twenty-foot equivalant units (TEUs). TEUs for the earlier year were calculated based upon an assumption that the average container held 10.91 long tons. This 10.91 conversion fector was the mean tonnage of all United States container movements in 1980.

Regional growth in containerized movements from 1974 to 1980 increased by elmost 161 percant in TEUs and 134 percent in tonnage. Table 6 gives the data for TEUs and short tons for the three porta comprising the Northeast Florida/Georgia region.

TABLE 6

INTERNATIONAL CONTAINER MOVEMENTS
NORTHEAST FLORIDA/GEORGIA REGION
(WEIGHT IN SHORT TONS)

	1974		1980		CHANGE 1974-1980	
	TEUs	TONS	TEUs	TONS	TEUs	TONS
Jacksonville						
Imports	4,267	41,567	10,466	92,082	6.199	50,515
Exports	7,381	71,899	25,675	188,682	18,294	116,783
Total	11,648	113,466	36,141	280,764	24,493	167,298
Savannah						
Imports	11,982	116,674	33,639	271,906	21,657	155,232
Exports	24,232	235,993	55,038	536,839	30,806	300,846
Total	36,214	352,667	88,677	808,745	52,463	456,078
Brunswick						
Imports	0	0	1	25	1	25
Exports	4	30	0	0	-4	-30
Total	4	30	1	25	-3	-5
N. Florida/Georgia						
Imports	16,249	158,241	44,106	364,013	27,857	205,772
Exports	31,617	307,922	80,713	725,521	49,096	417,599
Total	47,866	466,163	124,819	1,089,534	76,953	623,371

Source: MARAD Containerized Foreign Trade Data, U.S. Department of Commerce, Maritime Administration, 1974 and 1980, (unpublished reports).

Jacksonville recorded approximately 25 percent of the containers and tonnage moved through the region in 1974. By 1980, it handled nearly 29 percent of the regional TEUs and 26 percent of the tonnage. The principal reason why the port's relative growth was only moderate was that it achieved e slower than avarage growth in imports which was not completely compensated for by exports. Although Brunswick moved only minor amounts of containers, its handle was inoluded to maintain continuity with the commodity analyses.

Index of Concentration

Data in Table 7 reveal that when Jacksonville's hypothetical TEUs and tonnage were compared to actual movemente for 1980, the port's total

TABLE 7

ACTUAL AND HYPOTHETICAL MOVEMENTS
OF THE PORT OF JACKSONVILLE'S CONTAINERS
COMPARED TO THE NORTHEAST FLORIDA/GEORGIA REGION
(WEIGHT IN SHORT TONS)

	1980					
	TEUs			TONS		
	ACTUAL	HYPOTHETICAL	DIFFERENCE	ACTUAL	HYPOTHETICAL	DIFFERENCE
Imports	10,466	11,582	-1,116	92,082	95,620	-3,538
Exports	25,675	18,842	6,833	188,682	169,407	19,275
Total	36,141	30,424	5,717	280,764	265,027	15,737

Source: MARAD Containerized Foreign Trade Data, U.S. Department of Commerce, Maritime Administration, 1974 and 1980, (unpublished reports) and author's calculations.

performance was positive. However, imports did not grow as quickly as the regional average, in fact they showed a decline. Despite an absolute positive import growth, Jacksonville lagged behind its major competitor, Savannah, which experienced higher growth rates. Nevertheless, Jacksonville's container traffic grew at a rate of 121 percent for imports and 162 percent for exports. This trend of exports exceeding imports was the general case for most Southeastern United States ports.

TABLE 8

LOCATION QUOTIENTS FOR JACKSONVILLE'S
CONTAINERIZED CARGO MOVEMENTS

	1974		1980		COMPARATIVE GAIN OR LOSS	
	TEUs	TONS	TEUs	TONS	TEUs	TONS
Imports	107.913	47.286	81.953	98.165	-25.960	26.879
Exports	95.934	101.305	109.862	100.921	13.928	-0.384

Source: MARAD Containerized Foreign Trade Data, U.S. Department of Commerce, Maritime Administration, 1974 and 1980, (unpublished reports) and Author's calculations.

Derived location quotients for both TEUs and tonnage for 1974 and 1980 are found in Table 8. Jacksonville's import LQ for TEUs slightly exceeded that for exports in 1974, however, the reverse was true by 1980. The LQ relationship for tonnage revealed a different pattern. Although the statistic for exports was greater than that for imports for both years, it decreased slightly over time, whila it more than doubled for imports. The observed deviation occurred despite a high absolute growth in TEUs, therefore one can conclude that heavier cargo was being carried in inbound boxes.

Summary and Conclusions

This paper has applied the two techniques--an index of concentration and a location quotieot--to a relatively small region composed of three domestic ports. It has demonstrated the value of such tools in attempting to describe ioterport competition. The strength of the index of coocentretion was that it accounted for magnitudee of flows in real numbera, while the strength of the location quotient was that it reflected change besed upon each year's commerce. By applying both techniques, apperent weaknesses of each can be minimized.

Jacksonville apparently had fared well over the study period even though it did not achieve the gains recorded by its major competitor, Savannah, Georgia. However, Jecksonville, both in commodity commerce and container traffic, showed robustness particularly in outbound movements. Chemicals and allied products and transportation equipment show positive potentials for future exports, while transport equipment (automohiles and parts) and nonmetallic minerals should enjoy continued import growth. Unfortunately, these cargoes are not generally carried in containers. However, the prognosis still is for continued increases in unitized hendling of a lerge admixture of consumer oriented cargoes.

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Martis, Kenneth C. and Ruth Anderson Rowles (eds.). The Historicel Atlas of United States Congressional Districts: 1789 - 1983. New York: The Free Press, 1982. xii + 302pp.

The history of this massive volume dates to 1936 when it was initiated as a long-range WPA project. After a desultory beginning, it was eventually ebandoned and the files housed at Columbia University. Professor Martis inherited the task when circumstances again required trensferral of the records to the University of Michigan. In essence, it consists of numerous maps depicting yea-and-nay roll call votes in both houses of Congress, much expanded and updated from its antecedents in The Atlas of Congressional Roll Calls published in 1943.

For those historians, sociologists, political scientists, geographers and classroom teachers in general who are concerned about the distribution of congressional sentiment on political issues, this atlas becomes the key research reference. Since it is a complete representative history of voting behavior for every city, county, and state of the United States by means of congressional districts, it is certain to become a standard referance on Congress and its activities.

Divided into three parts, the first of which is concerned with origins and representation of Congressional Districts, this atlas includes sections on malapportionment and gerrymandering as well. Other sections treat spatial aspects of "Roll-Call Voting Behavior" and something called "The Geogrephy of Congress." A very wide variety of subject matter, most of which will be of interest to the political scientist, is found in the section entitled "Mapping the Geographical Aspects of the Uhited States Congress." Part four on Methodology and Construction actually deals with some other things as well, including the historical development of pertinent maps and atlases.

Martis acknowledges that his assistant editor and cartographer, Rowles, eventually became the only member of the research group who fully understood all the aspects of this mammoth project and with whom he could discuss details. Be this as it may, the cartography, by the very nature of the data base, is rather pedestrian and uninspired. Only two maps are in color, the remainder (ca. 105) being the familiar state-county outlines with numerical designations for representatives from eech district.

Thorough bibliogrephicel references appear in the text and an index contains the names of more than 10,200 congressmen who have served their districts over the years eocompassed.

As a specialized research tool the Martis-Rowles atlas is not recommended for the average academic's personal library. Whatever the circumstancea, it is best placed on a low shelf; et approximately fifteen pounds it becomes dangerous if dislodged from above and may have a greater impact than the euthors intended.

Alan Craig

The cover of this Florida Geographer *shows a detail of the map of Congressional Districts of the Ninety-seventh Congress (1981-1983) taken from p. 215 of this book.*

TROPICAL CYCLONE RAINFALL STUDIES

Donald Brandes

Rainfall which occurs during the passage of a hurricane or tropical storm center several hundred miles away may or may not be directly related to the passing tropical cyclone. Satellite remote sensing imagery may be used to determine the areal distribution of clouds associated with the tropical cyclone and reveal the areas where rainfall was directly attributable to such a storm. Satellite imagery, however, exists only from 1960 to the present, and is difficult to obtain for 1960 through 1968. No such record of the continuity of cloud coverage is available for earlier times. Without knowing if an area was covered by clouds which emanated from a tropical system, it is not possible to determine with certainty if rain which fell at a given place was the result of the passing tropical cyclone or of other local or extra-tropical causes.

Previous Studies

Previous studies of tropical cyclone rainfall have failed to address the problem of whether a given observation of rain actually resulted from a specific storm. Cry (1967) discussed the problem of wind reducing the effectiveness of rain collection devices but neglects the question of whether the given sample should be considered at all. Goodyear (1968) avoided raw climatological data by using the United States Army Corps of Engineers information whenever possible. For earlier times he draws his information directly from summaries of weather station records, but gives no explanation of how it is known that the rainfall is the result of tropical cyclones in either situation. The Corps of Engineers' storm rainfall reports also disclosed no statement on this topic.

Milton (1978) cites Schoner and Molansky (1956) and Miller (1958) as having the most sophisticated networks of data with which to work, but it appears that their methodologies for selecting data were no more advanced than others who wrote on the topic of tropical cyclone rainfall. Schoner and Molansky listed "Climatological Data" or "Hydrologic Bulletins" of the Weather Bureau, and Corps of Engineers as their sources, just as Goodyear did, and made no further statement regarding the selection of data.

Miller chose to discontinue tabulating data whenever the winds around the center of the storm dropped below hurricane force. This practice ignores any rain which results from tropical storms and a substantial part of the rain resulting from dissipating hurricanes. Miller also discussed the problems of rain-gauge effectiveness and the possibility of orographic and extratropical influences on hurricane rainfall. He stated that hurricane rainfall data from Florida are virtually free of orographic and extratropical effects. While the flatness of Florida certainly minimizes orographic effects, the statement regarding extratropical influences must be questioned. NOAA satellite imagery of Hurricane Gladys, September 23, 1975 (Fig. 1), shows what appears to be a middle latitude frontal system blending with the tropical cyclone.

Gentry (1964) is the only author found who discussed a means for determining the actual areas in which rain is falling in the vicinity of a hurricane or tropical storm. He cited the use of airborne radar for the purpose of studying the patterns of hurricane rainbands. Gentry's methodology is quite expensive, however, and, like the use of satellite imagery, cannot be applied to historical data.

Criteria for Determining Rainfall Source

When no direct means are available for identifying the source of a rainfall datum, other ways have to be found to determine if rainfall can be attributed to a tropical cyclone. Several assumptions were tested as reasonable criteria on which to base such decisions. These assumptions were designed to provide a consistent set of criteria which could be applied in the absence of direct evidence. The results obtained by such criteria were compared to the conclusions derived from remote sensing imagery, and rainfall data from nineteen weather stations in and near the South Florida Water Management District, the area for which the storm rainfall was studied (Brandes, 1982) (Fig. 2).

Some Discarded Assumptions

Although the author's initial assumptions appeared to be consistent with known patterns of hurricane behavior, most of them were found to produce conclusions which were inconsistent with those derived from the satellite images. One assumption was that the shape of the area where rainfall was influenced by a tropical cyclone would be congruent with the shape of a smaller area defined by specific values indicating heavy rainfall and strong wind. It was found, however, that the data did not substantiate this, although a larger network of stations might yield a more conclusive pattern.

Another assumption was that if a station which reported no rainfall on a given day lies between an area of known tropical cyclone influence and another station which reported some rainfall, the rain which fell at locations beyond the dry station is not the result of the tropical cyclone. This assumption was based on the expectation that any station which is under the influence of a tropical cyclone should receive at least a small quantity of rain during a twenty-four hour period. It was found, however, that although a well developed, tightly formed hurricane, such as Allan, August 1980 (Fig. 3), will yield such a rainfall pattern, relatively dry storms with poorly developed circulation, such as Tropical Storm Amy on June 26, 1975 (Fig. 4), may pass some stations without dropping rain for twenty-four hour periods. A further difficulty is the quality of the raw data. Weather stations do not all record their data at the same time of day. Thus, rain which falls simultaneously in two different locations may be attributed to different days and rain which falls on adjoining days may be attributed to the same day.

A third assumption was that for any location which is known to receive precipitation from a tropical storm or hurricane on at least one day, the period of time in which the place was influenced by the storm will extend neither earlier than the last preceding dry day nor later than the next following day without rain. Widely spaced rainbands and erratic rainfall patterns of some storms impair the utility of this criterion as well, particularly for relatively dry storms. The quality of the data also presents another problem. Occasionally the passage of a hurricane may disable the rain gauge or prevent the observer from recording each day of rainfall. Several days of rainfall may go unrecorded or may be reported in a single observation. Published summaries of climatological data normally contain notes when cumulative quantities for several days are reported, but there appear to be unnoted instances of such reports as well, as for example at Okeechobee in 1939 when no rain was recorded for two days while the eye of a hurricane passed over the area , but more than three inches was recorded for the following day when the storm center was several hundred miles away.

An Effective Procedure

Wide variability in the size, shape, intensity, and rainfall patterns of hurricanes and tropical storms precluded the prescription of any rigidly defined methodology for determining whether a given observation of rainfall was the result of a tropical cyclone system, at least within the confines of the study area. Expanding the study area to include the entire Gulf of Mexico, Atlantic Ocean coasts of North America, and islands of the Caribbean region might, however, provide some more definitive statements on this topic.

The most effective procedure which was tried in this study was to plot the daily rainfall values on maps of the study area and to examine the spatial and temporal distributions of rainfall across the study area for the several days while each storm passed. Prior to the arrival of a hurricane or tropical storm, there were usually several days when rain was reported at few, if any, stations. If rain was found at a majority of stations, the quantities would tend to be small and randomly distributed across the area. With the approach of a tropical system, rainfall generally increased in frequency and quantity for several days before returning to pre-storm levels.

The principles of spatial and temporal continuity apply to tropical cyclone rainfall but not in the rigidly defined manner which was prescribed by earlier assumptions. If one or several stations report no rain on a given day, those stations and others yet more distant from the storm center may still be judged to be under the influence of the tropical system if the proximity of the storm and the general pattern of circulation around it can be used to explain the pattern of rainfall observations.

In most instances, if rain was falling at a given location and there was a tropical weather system centered within 300 miles of the site, the rain could be attributed to that storm. The 300-mile maximum radius conforms to the limit of the area for which Miller (1958) selected data. Miller, however, used that distance as a rigid arbitrary limit while the present findings suggest only that it is an approximate median of the radius of the area that would be influenced by a hurricane or tropical storm. This radius may actually vary from 150 to 600 miles from the storm center, and therefore must be determined individually for each storm. The use of any predetermined or arbitrary limit to the distance from a tropical cyclone center for which data will be accepted would yield misleading results in most instances.

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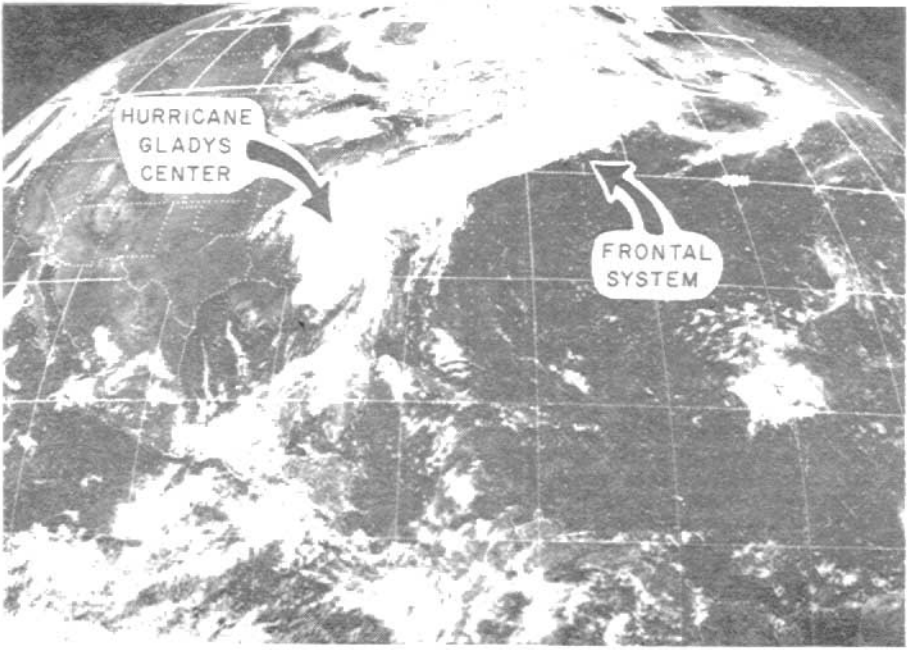
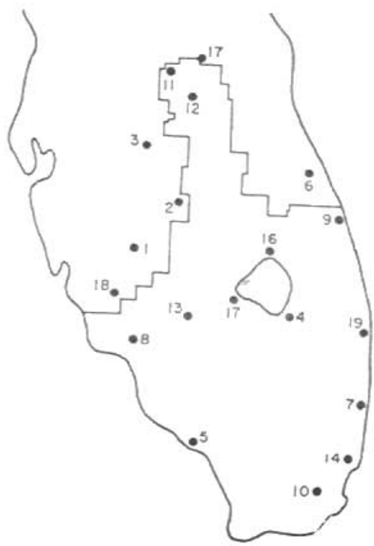


Fig. 1. Hurricane Gladys, September 13, 1975.

FIGURE 2

WEATHER STATIONS

1 Arcadia
2 Avon Park
3 Bartow
4 Belle Glade
5 Everglades
6 Fellsmere
7 Fort Lauderdale
8 Fort Myers
9 Fort Pierce
10 Homestead
11 Isleworth
12 Kissimmee
13 La Belle
14 Miami
15 Moore Haven
16 Okeechobee
17 Orlando
18 Punta Gorda
19 West Palm Beach



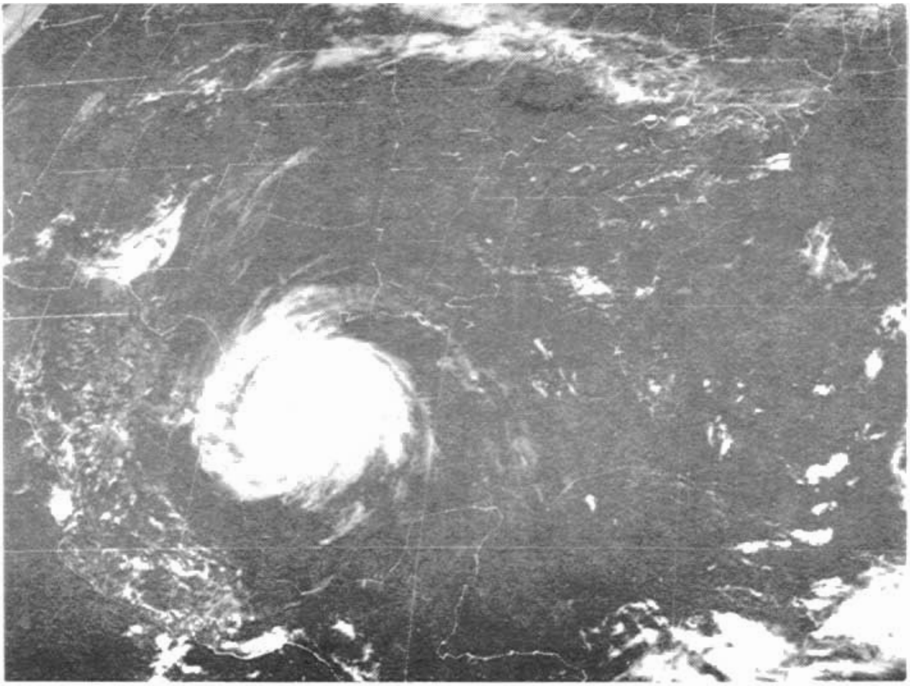


Fig. 3. Hurricane Allen, August 1980.

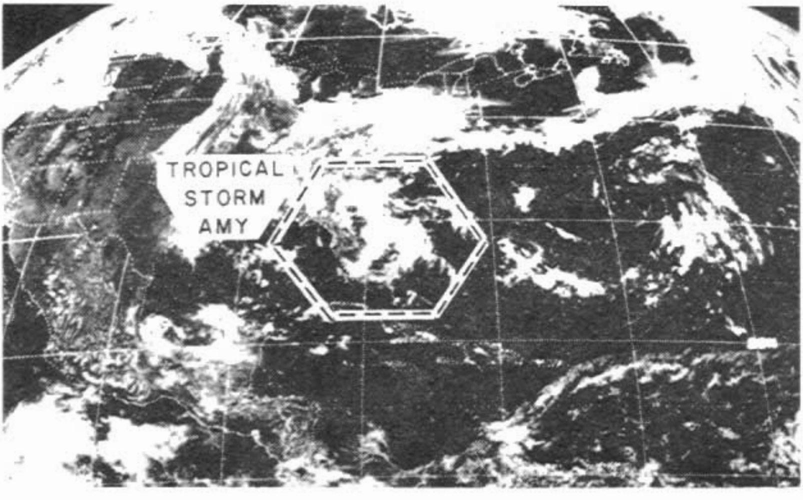


Fig. 4. Tropical Storm Amy, June 26, 1975

FLORIDIANS IN MAJOR COLLEGE FOOTBALL, 1981[1]

Harold McConnell

Anthony Carter of Michigan, George Peoples of Auburn, Eddie Weaver of Georgia, Larry Kissner of Notre Dame, Nate Dozier of Louisville, Mike Reilly of Oklahoma, and Cedric Anderson of Ohio State — the reader may recognize these as names of major college football players in the early 1980's. However, they shared an additional attribute: all were Florida residents who competed for institutions outside the state. This paper describes certain geographic aspects of participation in major college football by Floridians during the 1981 season. It also addresses the county-level relationship between population and number of Floridians in major college football, and models their out-of-state migration.

TABLE 1

LEADING NET EXPORTERS AND IMPORTERS OF MAJOR COLLEGE FOOTBALL PLAYERS

State	Major Programs	Playing in Home State	Participating in Major Programs in Other States	Recruited from Outside State*	Net
			Exporters		
CA	10	740	1,010	143	867
FL	5	332	626	95	531
GA	2	93	525	58	467
OH	9	634	666	276	390
NJ	2	63	527	162	365
PA	7	373	626	378	248
IL	7	394	436	222	214
NY	5	176	465	315	150
TX	15	1,163	413	266	147
MO	1	77	184	48	136
			Importers		
ID	3	87	21	175	-154
LA	11	700	140	313	-173
NH	2	18	19	205	-186
IA	4	145	39	227	-188
SC	5	156	92	312	-220
UT	4	99	13	254	-241
IN	5	157	124	383	-259
KY	6	197	51	324	-273
NC	9	415	122	445	-323
TN	9	327	137	480	-343

* Also includes Alaska, North Dakota, South Dakota, Vermont, U.S. Territories, Canada, and other foreign countries.

Source: 1981 rosters

TABLE 2

LARGEST PRODUCERS OF MAJOR COLLEGE FOOTBALL PLAYERS

Rank	Rooney (1974)		1981 Rosters	
1	CA	1,443	CA	1,750
2	OH	1,350	TX	1,576
3	PA	1,333	OH	1,300
4	TX	1,290	PA	999
5	IL	707	FL	958
6	NY	625	LA	840
7	NJ	579	IL	830
8	MA	426	NY	641
9	MI	420	GA	618
10	FL	409	NJ	590

Source: Rooney (1974, p. 133), 1981 rosters

Unlike typical newspaper usage and previous studies by Rooney (1969, 1974, 1980), a major college program is here defined as a football program found in any member institution of National Collegiate Athletic Association Divisions 1A or 1AA. There were 187 major programs in 46 states and the District of Columbia in 1981; 137 of them in Division 1A and 50 in Division 1AA. Texas had the largest number (15), followed by Louisiana and California with 11 and 10, respectively. Alternatively, Hawaii, Maine, Minnesota, Missouri, Nebraska, Wisconsin, and Wyoming supported but one program each.2

Examination of all 187 rosters revealed that 958 Floridians participated in 122 programs in 40 states.2 Of these, only 35 percent (322 players) were on the rosters of the five major programs in football, Bethune-Cookman, Florida, Florida A & M, Florida State, and Miami. The rest (626 players) competed for programs outside the state.3 Few states have a surplus of major college-level football players, and most import more players than they export. Florida is one of the few favored states,4 ranking second only to California as a net exporter of major college football players (Table 1). Georgia ranked a surprising third.

The Status of Floridians in Major College Football

Florida high school athletic programs have become increasingly important producers of "big-time" college football talent (Table 2). One possible reason is that the number of Division 1 programs in 1981 was substantially larger than Rooney's 1974 sample (p. 102) which excluded many institutions now competing in Division 1AA -- many of them in the South and some of them historically black.

Florida ranked fifth in 1981 behind such traditional producers of football talent as California, Texas, Ohio, and Pennsylvania in frequency of appearance, whereas it ranked but tenth at the time of publication in Rooney's book (1974, p. 133).5

Of even greater significance is the fact that Florida produces a much larger number of major college football players than it requires to meet the needs of its own schools; in 1981, Florida trailed only California and Ohio and was tied with Pennsylvania for number of residents competing in programs in other states. Clearly, Florida is a significant producer of major college football talent, not only for the five major programs in the state, but for the rest of the country as well.

Where Did They Come From?

The home counties of the 958 Floridians and the number of players statistically predicted for each county were tabulated (Table 3). Expectedly, there was a strong direct relationship between the number of major college football players residing in a county and its population: the most populous counties produced the most players. Total population alone explained 91 percent of the variation ($r_{xy}=0.954$) in numbers of players produced by a county's high school athletic programs.

The residuals of the regression suggest additional factors which, if quantified, might further reduce the amount of variation in number of players per county: reputation, population structure, and proximity to a major college program. The first is the reputation (perceived quality) of the programs, particularly among college recruiters. The most populous counties were generally underestimated, which suggests either that they produce an inordinately large number of major college-quality football players for their population, or that recruiters believe that they produce the best players, presumably because of superior coaching and facilities. One might also argue that because the most populous counties are best connected with the rest of the country through major airports and interstate highways, their high school players are most accessible to recruiters and are therefore more likely to be awarded college grants-in-aid.6 Furthermore, metropolitan area players are most likely to benefit from expanded media exposure.

The second factor is a county's population structure. Total population seriously overpredicted overprediction of the number of players from several South Florida "retirement counties." The number of persons in a lower age cohort would likely have been a somewhat more definitive independent variable than total population.

A third possible factor is proximity to a major program, which may increase an athlete's desire to compete at the college level, or at least his level of awareness of the possibility, even though he may not matriculate at a local college. As evidence of this, the number of players from Alachua, Dade, and Leon Counties was underpredicted by at least one-half standard error of estimate.

Where Did They Go?

The forty-six states in which major college football is played have been aggregated into ten origin-destination regions, using such criteria as geographic proximity, current conference affiliation of the dominant programs in a state, traditional rivalries and scheduling, and the author's perception of such factors as commonality of purpose and comparative level of fan support. The regions thus delineated are:

I-New England (Connecticut, Maine, Massachusetts, New Hampshire, and Rhode Island): most institutions are members of either the Ivy League or Division IAA Yankee Conference. In contrast with the other regions, the most

TABLE 3

ACTUAL AND PREDICTED NUMBER OF MAJOR COLLEGE

FOOTBALL PLAYERS BY COUNTY

County	Actual	Predicted	County	Actual	Predicted
Alachua	22	14#	Lake	15	9#
Baker	2	0	Lee	4	21*
Bay	10	10	Leon	23	15#
Bradford	1	1	Levy	3	1
Brevard	47	28#	Liberty	0	-1
Broward	85	111*	Madison	2	1
Calhoun	2	0	Manatee	7	14*
Charlotte	1	4	Marion	10	11
Citrus	1	4	Martin	4	6
Clay	2	6	Monroe	4	6
Collier	7	8	Nassau	5	3
Columbia	6	2	Okaloosa	16	11#
Dade	190	166#	Okeechobee	1	1
De Soto	2	1	Orange	46	49
Dixie	0	0	Osceola	2	4
Duval	82	66#	Palm Beach	43	61*
Escambia	17	25*	Pasco	7	18*
Flagler	2	0	Pinellas	42	78*
Franklin	0	0	Polk	43	31#
Gadsden	3	3	Putnam	3	4
Gilchrist	1	0	St. Johns	2	4
Glades	0	0	St. Lucie	11	8
Gulf	2	0	Santa Rosa	6	5
Hamilton	1	0	Sarasota	11	20*
Hardee	3	1	Seminole	11	17*
Hendry	2	1	Sumter	0	2
Hernando	3	3	Suwannee	1	1
Highlands	3	4	Taylor	3	1
Hillsborough	95	69#	Union	0	0
Holmes	2	0	Volusia	28	24
Indian River	5	4	Wakulla	2	0
Jackson	1	4	Walton	0	1
Jefferson	2	0	Washington	1	0
Lafayette	0	-1			

$E(Y_i) = 0.1096X_i - 1.13$ $r_{xy} = 0.954$ $S_{E(Y)} = 9.056$

* Overprediction by at least one-half standard error of estimate.
\# Underprediction by at least one half standard error of estimate.

Source: Calculated by author

successful programs and those with the highest levels of interest and institutional support are those representing private colleges and universities.

II-Independentia (Delaware, New Jersey, New York, Pennsylvania, and West Virginia): the dominant programs (e.g., Penn State, Pittsburgh, and Syracuse) compete as independents.

III-South Atlantic (Maryland and the District of Columbia, North Carolina, South Carolina, and Virginia): the dominant programs are members of the Atlantic Coast Conference.

IV-Deep South (Alabama, Florida, Georgia, Kentucky, Louisiana, Mississippi, and Tennessee): the region is traditionally associated with the Southeastern Conference, notwithstanding the recent national prominence of such independents as Florida State, Miami, and Southern Mississippi.

V-Midwest (Illinois, Indiana, Iowa, Michigan, Minnesota, Ohio, and Wisconsin): the region is dominated by the member schools of the Big Ten Conference and independent Notre Dame.

VI-Great Plains (Kansas, Missouri, Nebraska, and Oklahoma): the dominant programs are the more successful members of the Big Eight Conference.

VII-Southwest (Arkansas and Texas): the dominant programs are members of the Southwest Conference.

VIII-Big Skyland (Idaho and Montana): all major institutions are members of the Division 1AA Big Sky Conference. This is the only region where no programs competa at the 1A level.

IX-Aridia (Colorado, Hawaii, Nevada, New Mexico, Utah, and Wyoming): at least one institution per state competes in the Western Athletic Conference in this far-flung, non-contiguous region.

X-Far West (Arizona, California, Oregon, and Washington): the dominant programs are members of the Pacific Ten Conference.

Five regions enjoy a talent surplus and five are talent-deficit. The net exporters include Regions II-Independentia (589), IV-Deep South (180), V-Midwest (307), VII-Southwest (109), and X-Far West (745). The net importers include Regions I-New England (-416), III-South Atlantic (-547), VI-Great Plains (105), VIII-Big Skyland (-235), and IX-Aridia (-627). Inter- and intraregional flows are given in origin-designation matrix form in Table 4. Because of the large surplus of football talent in Florida, out-of-state recruiters are active in the state. Thus, Floridians are prone to migrate elsewhere.7

TABLE 4

REGIONAL ORIGIN-DESTINATION MATRIX

From \ To	I	II	III	IV	V	VI	VII	VIII	IX	X	Total
I	645	128	27	9	18	2	4	1	4	10	843
II	337	1255	348	121	214	17	23	8	34	43	2400
III	41	95	1290	104	58	21	4	2	17	15	1647
IV	24	81	372	2961	136	38	132	6	57	28	3815
V	150	193	107	220	2457	76	45	17	68	71	3404
VI	8	11	15	24	99	518	58	6	26	12	777
VII	4	17	12	156	10	133	1290	0	95	16	1733
VIII	0	0	1	1	1	0	0	175	10	14	200
IX	7	9	3	7	16	22	29	30	387	42	542
X	43	22	24	32	88	55	39	202	491	1335	2331
Total	1259	1811	2194	3635	3097	882	1624	435	1169	1586	17692

Source: 1981 rosters

Distributional Patterns.

Floridians in major college football in 1981 have been enumerated at the institutional and state levels (Table 5). Institutional characteristics, including NCAA level, institutional control, racial identity, and conference affiliation (if any) are also noted.

The Institutions. Floridians appeared on the rosters of 122 (65 percent) of the 187 major college programs. As one might expect, most attended the five Florida football schools. There was a moderate inverse relationship between the number of Floridians on a roster and distance from Florida, but the distance-decline was not linear. Floridians were well represented in states near to, but not contiguous with, Florida. Smallest numbers generally occurred in the Northeast and West, and intermediate numbers occurred in the Midwest and Great Plains. The spatially, culturally, and climatologically distant University of Minnesota's roster contained eight Floridians, rather more than would be exptected.

TABLE 5

DISTRIBUTION OF FLORIDIANS BY INSTITUTION AND STATE

Region	State	Major Programs	Major Programs with Florida Players	NCAA Div.	Inst. Control	Black Inst.	Conference	Florida Players	State Total
I	CT	2	Yale	IA	P		IL	2*	2
	ME	1							0
	MA	6	Boston U.	IAA	P		Y	1	
			Harvard	IA	P		IL	4*	
			Northeastern	IAA	P		--	1	6
	NH	2	Dartmouth	IA	P		IL	4*	4
	RI	2	Brown	IA	P		IL	3*	3
II	DE	2	Delaware St.	IAA	S	x	MEA	19	19
	NJ	2	Princeton	IA	P		IL	5*	5
	NY	5	Army	IA	F		--	4*	
			Colgate	IA	P		--	1*	
			Columbia	IA	P		IL	3*	
			Cornell	IA	P		IL	1*	9
	PA	7	Lafayette	IAA	P		MF	1	
			Pennsylvania	IA	P		IL	10*	
			Pittsburgh	IA	S		--	5	16
	WV	2	Marshall	IA	S		S	5	
			West Virginia	IA	S		--	1	6
III	MD(DC)	3	Navy	IA	F		--	4*	4
	NC	9	Appalachian St.	IA	S		S	1*	
			Davidson	IAA	P		--	23	
			Duke	IA	P		AC	3	
			E. Carolina	IA	S		--	2	
			No. Carolina	IA	S		AC	1	
			No. Car. A&T	IAA	S	x	MEA	4*	
			No. Car. St.	IA	S		AC	3	
			Wake Forest	IA	P		AC	4	
			W. Carolina	IA	S		S	3	44
	SC	5	The Citadel	IA	S		S	13	
			Clemson	IA	S		AC	6	
			Furman	IA	P		S	18	
			S. Carolina	IA	S		--	8*	
			S. Carolina St.	IAA	S	x	MEA	17	62
	VA	6	Richmond	IA	P		--	5*	
			Virginia	IA	S		AC	3	
			VMI	IA	S		S	1	
			Wm. & Mary	IA	S		--	1*	10
IV	AL	2	Alabama	IA	S		SE	11	
			Auburn	IA	S		SE	12	23
	FL	5	Bethune-Cookman	IAA	P	x	MEA	47	
			Florida	IA	S		SE	92	
			Florida A&M	IAA	S	x	MEA	83	
			Florida St.	IA	S		--	69	
			Miami	IA	P		--	41*	332
	GA	2	Georgia	IA	S		SE	9*	
			Georgia Tech	IA	S		AC	15*	24
	KY	6	E. Kentucky	IAA	S		OV	25	
			Kentucky	IA	S		SE	8	
			Louisville	IA	S		--	9	
			Morehead St.	IAA	S		OV	7	
			Murray St.	IAA	S		OV	9	
			W. Kentucky	IAA	S		OV	4	62

Table 5 (cont.)

	LA	11	Louisiana St.	1A	S		SE	2	
			Louisiana Tech	1A	S		SL	1	
			McNeese St.	1A	S		SL	1	
			Nicholls St.	1AA	S		--	1	
			NE Louisiana	1A	S		--	2	
			Northwestern St.	1AA	S		--	1	
			SE Louisiana	1AA	S		--	1	
			Southern	1AA	S	x	SWN	11	
			SW Louisiana	1A	S		SL	7*	
			Tulane	1A	P		--	15	42
	MS	6	Jackson St.	1AA	S	x	SWN	1	
			Mississippi	1A	S		SE	1	
			Mississippi St.	1A	S		SE	11	
			Miss. Valley St.	1AA	S	x	SWN	3	
			So. Mississippi	1A	S		--	5*	21
	TN	9	Austin Peay	1AA	S		OV	6	
			E. Tennessee	1A	S		S	13	
			Memphis St.	1A	S		--	14	
			Middle Tenn.	1AA	S		OV	3	
			Tennessee	1A	S		SE	5*	
			Tennessee-Chattanooga	1A	S		S	22	
			Tennessee St.	1AA	S	x	--	3	
			Tennessee Tech	1AA	S		OV	17	
			Vanderbilt	1A	P		SE	16*	99
	IL	7	E. Illinois	1AA	S		MC	1	
			Illinois	1A	S		BT	9	
			Illinois St.	1A	S		MV	5	
			Northwestern	1A	P		BT	4	19
	IN	5	Indiana	1A	S		BT	3	
			Indiana St.	1A	S		MV	1	
			Notre Dame	1A	P		--	1	
			Purdue	1A	S		BT	2	7
	IA	4	Iowa	1A	S		BT	1	
			Iowa St.	1A	S		BE	6	
			Northern Iowa	1AA	S		MC	1	8
	MI	5	Michigan	1A	S		BT	9	
			Michigan St.	1A	S		BT	4	13
	MN	1	Minnesota	1A	S		BT	8	8
	OH	9	Cincinnati	1A	S		--	9	
			Ohio St.	1A	S		BT	6	
			Toledo	1A	S		MA	1	
			Youngstown St.	1AA	S		OV	2	18
	WI	1	Wisconsin	1A	S		BT	2	2
I	KS	3	Kansas	1A	S		BE	7	
			Kansas St.	1A	S		BE	1	
			Wichita St.	1A	S		MV	7	15
	ND	1							0
	NE	1	Nebraska	1A	S		BE	1*	1
	OK	3	Oklahoma	1A	S		BE	5	
			Oklahoma St.	1A	S		BE	1	6
II	AR	2	Arkansas	1A	S		SW	1	
			Arkansas St.	1A	S		SL	6	7
	TX	15	Baylor	1A	P		SW	1	
			Prairie View	1AA	S	x	SWN	6	
			Rice	1A	P		SW	1	
			So. Methodist	1A	P		SW	4	
			Texas	1A	S		SW	1	
			Texas-El Paso	1A	S		WA	5	
			Texas A&M	1A	S		SW	2	
			Tex. Southern	1AA	S	x	SWN	11	31
III	ID	3	Idaho St.	1AA	S		BS	1	1
	MT	2							0
K	CO	3	Air Force	1A	F		WA	7*	
			Colorado	1A	S		BE	4	
			Colorado St.	1A	S		WA	1	12
	HI	1							0
	NV	2	Nev.-Las Vegas	1A	S		--	2	2
	NM	2	New Mexico St.	1A	S		MV	3	3
	UT	4	Utah St.	1A	S		PC	3	3
	WY	1							0
	AZ	3	Arizona	1A	S		PT	2	
			Arizona St.	1A	S		PT	2	
			No. Arizona	1AA	S		BS	2	6
	CA	10	UCLA	1A	S		PT	2*	2
	OR	2	Oregon St.	1A	S		PT	1	1
	WA	2							0
rand Total		187	122					958	958

Institutional Support: (P) Private, (S) State, (F) Federal.

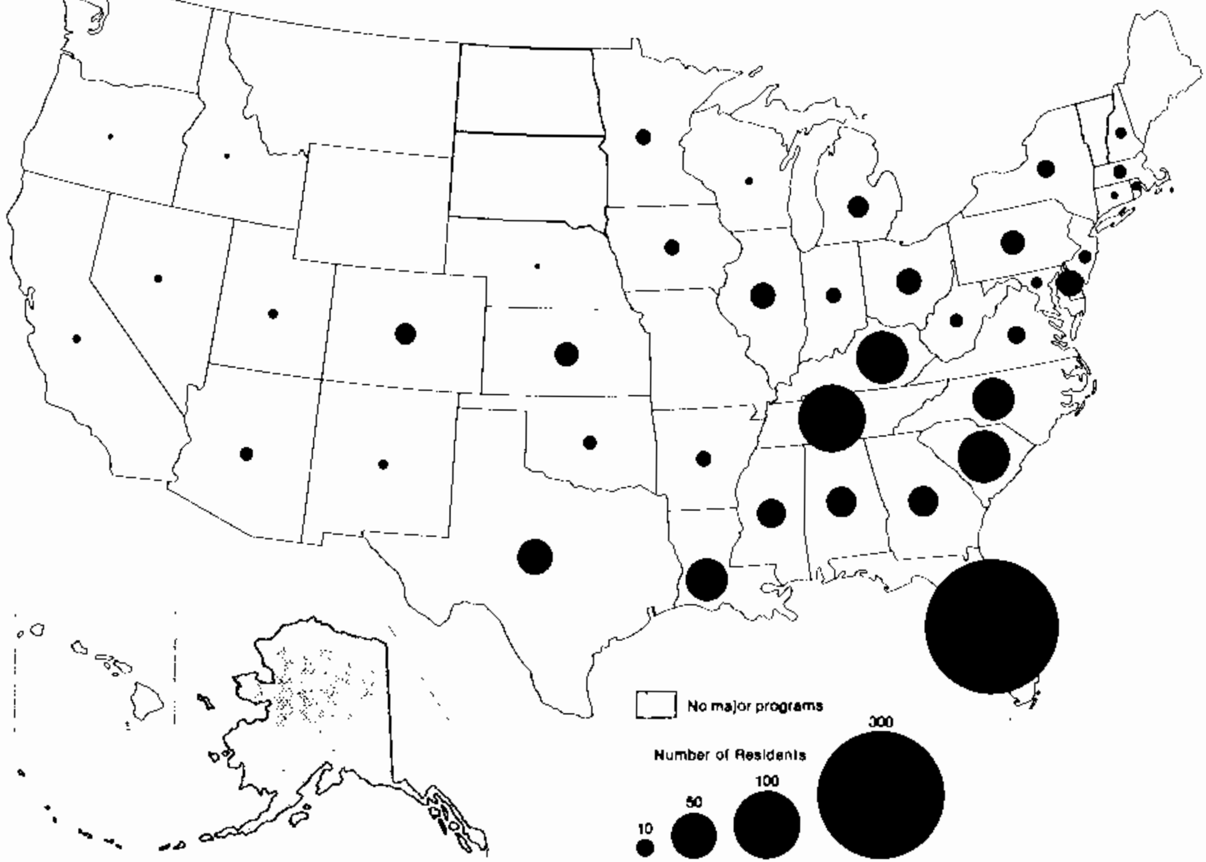
Conferences: (AC) Atlantic Coast, (BE) Big Eight, (BT) Big Ten, (BS) Big Sky, (IL) Ivy League, (MA) Mid-American, (MC) Mid-Continent, (MF) Middle Four, (MEA) Mid-Eastern Athletic, (MV) Missouri Valley, (OV) Ohio Valley, (PC) Pacific Coast Athletic Association, (PT) Pacific-Ten, (SE) Southeastern, (S) Southern, (SL) Southland, (SW) Southwest, (SWN) Southwestern, (WA) Western Athletic, (Y) Yankee.

* No Data on freshmen.

ource: Kavanaugh, ed. (1981); 1981 rosters

Figure 1

FLORIDA RESIDENTS IN MAJOR COLLEGE FOOTBALL, 1981



Some 205 Floridians (21 percent of all who played) competed for 11 of a possible 14 historically black institutions, whereas 753 (79 percent) played for 111 of a possible 173 predominantly white institutions. This pattern is consistent with the existence of two black colleges in Florida, the fact that much of Florida's major college-level football talent is black, and with the fact that all, save Delaware State, of the historically black institutions in major college football are located in the South. As evidenced by large numbers of their alumni in the National Football League, these institutions play excellent football. Because of this, their proximity, and the apparent preference of many black athletes to attend black colleges and universities, the historically black institutions can compete successfully for talent from Florida.8

Institutional Control. Two hundred nineteen Floridians (23 percent) competed for 23 of a possible 39 privately-controlled institutions, 724 (76 percent) for 96 of a possible 145 state-supported schools, and 15 (less than 2 percent) for the three major service academies. All Floridians playing in New England competed for private institutions. The private school figure averaged approximately 40 percent in Regions II and III and approached 20 percent in Regions IV and VII. Two Florida schools (Bethune-Cookman and Miami) are privately controlled.

NCAA Divisions. Six hundred forty-six Floridians (67 percent) competed for 92 of the possible 137 Division 1A institutions, while 312 (33 per cent) were listed on 30 of the 50 1AA rosters. The 1A schools comprised 73 percent of the total in 1981. Thus, it appears that Florida was underrepresented nationally in Division 1A and overrepresented in Division 1AA. This distribution can probably be explained by the fact that Florida has two 1AA schools, as well as by the fact that the three regions comprising the South (III, IV, and VII) contained 50 percent of the 1AA schools but only 41 percent of the 1A schools. A short distance migration within or near Florida was disproportionately likely to be to a 1AA school: Floridians competing at this level were relatively concentrated in the South. Alternatively, longer-distance migrations of smaller numbers of "blue-chip" players were likely to be to Division 1A institutions.

The States. The inverse relationship with distance from Florida is evident (Fig. 1). Three hundred thirty-two Floridians played for Florida schools, while 626 migrated out-of-state. Other than Florida, Tennessee's rosters contained the largest number (99), followed by Kentucky and South Carolina (62 each), North Carolina (44), Louisiana (42), and Texas (31). The number of Floridians per state declined in all directions, but the slope was steeper in the Northeast and Northwest than in the North and West. Florida was well-represented in Regions V, VI, and VII, despite the considerable distance. Those states with no Floridians included Hawaii, Maine, Missouri, Montana, Washington, and Wyoming. Complete absence is regarded as a function both of low demand for out-of-state players (four of these states supported but one major college program each and the others had but two each) and tyranny of distance from Florida. The steep decline to the Northeast can probably be explained by the fact that the needs of the talent-deficit states in Regions I, II, and III have historically been met by closer talent-surplus states, such as New Jersey, New York, Ohio, and Pennsylvania. Recruiters from these areas have only recently begun to search for players in Florida.

The Regions. The distance-decline is more readily apparent (Table 6) than at either the institutional or state levels; both the number of players per region and proportion of programs with Florida players decreased with distance from the Deep South. Aside from the Deep South (Region IV), Florida was best represented in the South Atlantic (Region III), followed by the Midwest (Region V), although the proportion of institutions with Floridians was higher in Region VI (Great Plains) than in Region V (Midwest). This is probably attributable to the fact that all Great Plains institutions competed in Division 1A, whereas there were numerous 1AA schools in the Midwest. It was suggested earlier that players are unlikely to migrate long distances to 1AA schools: 1AA

TABLE 6

DISTRIBUTION OF FLORIDIANS BY FOOTBALL REGION

Region	Major Programs	Major Programs with Florida Players	Number of Florida Players
I	13	6	15
II	18	11	55
III	25	19	120
IV	41	39	603
V	32	19	75
VI	8	6	22
VII	17	10	38
VIII	5	1	1
IX	13	6	20
X	17	5	9
Total	187	122	958

Source: 1981 rosters

recruitment is geographically constrained. As further evidence, one might note the paucity of Floridians in Region VIII, which is entirely a 1AA region.

The Conferences. Since many conferences transcend regional boundaries, their patterns are more complex. In fact, 200 players were listed on the rosters of southern independents (including Florida State and Miami). However, there is continuing evidence of the distance-decline.

There was at least one Floridian in every athletic conference (Table 7). Largest numbers (170) competed in the Division 1AA Mid-Eastern Athletic Conference, which has two member schools (Bethune-Cookman and Florida A & M) in Florida. The MEAC was followed by the Southeastern Conference (167 Floridians on its ten rosters), of which the University of Florida is a member. Others with 25 or more included the Atlantic Coast Conference (35), the Big Eight (25), the Big Ten (48), the Ivy League (32), the Ohio Valley (73), the Southern Conference (76) and Southwestern Athletic Conference (32).

As suggested earlier, despite the fact that large numbers were not involved, the proportion of institutions with Florida players was higher for geographically distant 1A conferences than for comparable 1AA conferences, such as the Big Sky, Middle Four, and Yankee Conferences.9

A Simple Model of Out-of-State Migration

The purpose of this section is to statistically explain at the state level the distribution of those 626 Floridians in out-of-state major college programs in 1981. In developing the model, four factors were elicited from the foregoing.

The first factor is that the states vary considerably in level of demand for out-of-state players. Demand seems to be largely a function of the number of programs within a state vis-a-vis its "home-grown" supply of quality players, which generally varies directly with its population: the larger the ratio of programs to population, the greater the reliance on out-of-state players if its programs are to be competitive.10 The relevancy of this factor can readily be seen in certain talent-deficit, lightly populated western states, such as Idaho, Nevada, Utah, and Wyoming. Rooney (1974) treats this subject at length. It is also evident east of the Mississippi in such heavy emphasis (for their population) states as New Hampshire, Rhode Island, Delaware, the Carolinas, Kentucky, Louisiana, Mississippi, and Tennessee.

DISTRIBUTION OF FLORIDIANS BY MAJOR ATHLETIC CONFERENCE

Conference	Divisional Level (1981)	Conference Members	Conference Members with Florida Players	Number of Florida Players
Atlanric Coast Conference	IA	8	7	35
Big Eight Conference	IA	8	7	25
Big Ten Conference	IA	10	10	48
Big Sky Conference	IAA	8	2	3
Ivy League	IA	8	8	32
Mid-American Conference	IA	10	1	1
Mid-Continent Conference	IAA	3*	2	2
Middle Four Conference	IAA	4	1	1
Mid-Eastern Athletic Conference	IAA	6	5	170
Missouri Valley Conference	IA	8	4	16
Ohio Valley Conference	IAA	9	8	73
Pacific Coast Athletic Association	IA	6	1	3
Pacific Ten Conference	IA	10	4	7
Southeastern Conference	IA	10	10	167
Southern Conference	IA	8	8	76
Southland Conference	IA	6	4	15
Southwest Conference	IA	9	6	10
Southwestern Conference	IAA	7	5	32
Southwestern Athletic Conference	IA	9	3	13
Yankee Conference	IAA	6	1	1
Eastern Independents		12	6	16
Mid-Western Independents		2	2	10
Southern Independents		18	16	200
Southwestern & Western Independents		2	1	2
Total		187	122	958

* The fourth member school, Southwest Missouri, competed in NCAA Division 2 in 1981.

Source: Kavanaugh, ed. (1981), 1981 rosters

The second factor is the type of institutions in a state. All other things (especially population) being equal, those states with duplicative higher educational systems, whether public-private or black-white, tend to support larger numbers of programs and thus have higher aggregate demand for out-of-state players than those with single educational systems. The relevancy of this "private institutions-black institutions" factor can be seen in such talent-deficit regions as New England and the South Atlantic.

The third factor is distance from Florida. The existence of an apparent distance-decline function has been discussed previously. The gravity model literature is rich with examples where the number of migrants to a destination varies inversely with distance from a source (see, for example: Carrothers, 1956; Cavanaugh, 1950; Isard, 1960; Lukerman and Porter, 1960; McConnell, 1965; and Stewart and Warntz, 1958).

The fourth is the presence of an intervening supplier, or barrier to migration from Florida, a concept compatible with that of an intervening opportunity (Stouffer, 1940). As noted earlier, sixteen other states had a net surplus of major collage football players in 1981. Any one of these located nearer to a talent-deficit state than Florida can be considered to have been an intervening supplier. For example, in comparison with Florida, California was an intarvening suppliar for Utah, Texas for New Mexico, Georgia for either North Carolina or Tennessee, Pennsylvania for New Hampshire, Ohio for Kentucky, and both Ohio and Illinois for Indiana.11

TABLE 8

OUT-OF-STATE MIGRATION

ACTUAL AND PREDICTED NUMBER OF FLORIDIANS

Region	State	Actual	Predicted	Region	State	Actual	Predicted
I	CT	2	7	V	IL	19	15
	ME	0	0		IN	7	33*
	MA	6	22*		IA	8	12
	NH	4	10*		MI	13	8
	RI	3	5		MN	8	-1#
	Total	15	44		OH	18	22
II	DE	19	8#		WI	2	0
	NJ	5	10		Total	75	89
	NY	9	19*	VI	KS	15	7#
	PA	16	29*		MO	0	0
	WV	6	11		NE	1	-1
	Total	55	77		OK	6	10
III	MD(DC)	4	16*		Total	22	16
	NC	44	61*	VII	AR	7	6
	SC	62	62		TX	31	16#
	VA	10	33*		Total	38	22
	Total	120	172	VIII	ID	1	3
IV	AL	23	13#		MT	0	0
	GA	24	12#		Total	1	3
	KY	62	34#	IX	CO	12	7
	LA	42	33#		NV	2	2
	MS	21	29*		NM	3	3
	TN	99	61#		UT	3	7
	Total	271	182		WY	0	-2
					Total	20	17
				X	AZ	6	4
					CA	2	1
					OR	1	1
					WA	0	-1
					Total	9	5

$E(Y_i) = 3.5072X_i - 3.9303$ $r_{xy} = 0.824$ $S_{E(Y)} = 11.49$

* Overprediction by at least one-half standard error of estimate.
\# Underprediction by at least one-half standard error of estimate.

Source: Calculated by author

The Statistical Model.

As a first approximation to an explanatory model which would seem to incorporate the foregoing, it was decided to employ as the dependent variable tha number of players on all major college rosters in a state and as the independent variable a measure of gravitational attraction on Florida, quantified for each state with major programs (except Hawaii) by the ratic cf its aggregate out-of-state demand to the distance in standard units between the approximate geographic centers of both states. Hawaii was omitted because of its tremandous distance from the conterminous United States. Thus, N = 44. It was hypothesized that the number of Floridians varies directly with gravitational attraction. The results of a regression-correlation analysis and patterns of over- and underprediction are presented in Table 8. While a formal test for significance was not conducted because of apparent lack of normality and the fact that we were dealing with a population instead of a sample, the model was generelly successful. Gravitational attraction explained approximately 67 percent (rxy=0.824) of the variation in number cf players from Florida.

Residuals from Regression.

Using over- and underprediction by at least one-half standard error as critical, interesting patterns emerged. Gravitational attraction overpredicted the number of Floridians competing in Massanhusetts, New Hampshire, New York, Pennsylvanie, Maryland and the District of Columbia, North Carolina, Virginia, Mississippi, and Indiana. Underprediction occurred in Delaware, Alabama, Georgia, Kentucky, Louisiana, Tennessee, Minnesota, Kansas, and Texas. The regional sums suggest that gravitational attraction overpredicted northeasterly and northerly migrations, underpredicted intraregionel flows and those to the Greet Plains and Southwest, and was most successful in the West.

Explanation of Patterns.

Which factors might, if quantified in multiple regression, account for these patterns? The most evident is a private institutions factor. Privately-controllad institutions comprise approximately 41 percent of the total in the overpredicted states and but 12 percent in the underpredicted states. Moreover, the overpredicted states contain twenty of the total of thirty-nine private institutions, whereas but six are located in the underpredicted states. Further examination of the rosters of the private institutions in the overpredicted states in New England and "Independentia" revealed disproportionately large numbers of players with either parochial high school or preparatory school backgrounds, neither of which is characteristic of the typicel Floridian.

Other possible factors include cultural similarity or relative proximity to Florida, a more sensitive measure of intervening suppliers and one which would incorporate the geographical biases and social experiences of both recruiters and players. The first might be operationalized by calibrating the measure of gravitational attraction with a distance exponent larger than one, whereas the second should take into account that critical mass of talent-surplus states in the New Jersey, New York, Ohio, Pennsylvania cluster which, together with Georgia, seems to serve as an effectiva barrier to the Northeast (even in the nearby South Atlantic, only South Carolina was adequately predicted).

With respect to the last factor, the author is otherwise unabla to suggest why grevitational attraction overpredicted migration to Mississippi when all other states in the Deep South were underpredicted, and underpredicted migration to Minnesota. Is it possible that, because nf its dubious national image, Floridians are culturally biesed against competing for Mississippi institutions? The "Minnesota Connection" may be an isolete which requires deteiled investigation, possibly into the prior experiences of recruiters, players, and even former players. It is sufficient to say, however, that Florida to Minnesota flows also exist in college basketball and that Minnesota has had a tradition of recruiting in the South since the raign of Coach Murray Warmath (a Mississippi native) which began in the 1950's.

Florida has a huge surplus of major college-level talent and appears to play a larger role in the geography of football player production than previously. Floridian competing outside the state are most numerous in talent-deficient states in the Deep South and South Atlantic. They are also important in other areas of the country where recruiting is not dominated by such talent surplus states as California, Ohio, Pennsylvania and Texas.

* * *

1. I wish to thank Rance Ellis, Department of Geography, Florida State University, for data collection, the sports information directors of the various institutions for providing roster information (especially Wayne Hogan, now of Florida State but then at New Mexico), and the staff of the NCAA for answering numerous telephone inquiries, as well as providing me with the rosters of several institutions.

2. There were no major programs in Alaska, North Dakota, South Dakota, and Vermont. Subsequent reclassification by the NCAA resulted in the downgrading of forty programs classified as 1A in 1981 to 1AA for 1982. There are three Mid-American Conference schools whose classification was pending as of July, 1982. Two additional schools, Alabama State and Southwest Missouri, competed in Division 1AA in 1982, increasing the number of major programs to 189.

3. This contrasts with previous years (Rooney, 1969).

4. Only seventeen states exported more players than they imported on the 1981 rosters. Twenty-nine were net importers. Three southern states (Tennessee, North Carolinia, and Kentucky) had the worst negative balances of trade, although the percentage of out-of-state players was higher for New Hampshire, and certain western states, such as Nevada, Utah, and Wyoming.

5. Most institutions provided me with complete season-opening rosters, but some did not provide data on freshmen and a few provided spring practice rosters. Thus, the number of Floridians in major college football was more likely underestimated than overestimated.

6. The importance of the airplane and automobile in recruiting was chronicled by Rooney (1980, p. 35-65).

7. The data suggest that Floridians are more likely to migrate interregionally and less likely to remain in their home region than "Deep Southerners" as a whole, as the following demonstrate:

Probability of Migrating to:

	I	II	III	IV	V	VI	VII	VIII	IX	X
All Players from Region IV	.006	.021	.098	.776	.036	.010	.035	.002	.010	.007
Floridians	.036	.057	.125	.629	.078	.023	.040	.001	.021	.009

8. Florida A & M won the 1978 Division 1AA national playoffs. Tennessee State competed in Division 1A through the 1980 season.

9. This effect would have been even more evident if reorganization of the Division 1 programs had occurred prior to the 1981 season. The Mid-American Conference, which has had many of its programs downgraded, listed but one Floridian on its ten rosters.

10. A regression-correlation analysis of percentage of out-of-state players on all rosters in a state and the number of programs per one million population resulted in a correlation coefficient of 0.394.

11. A nearby talent-rich state, such as New Jersey, would have constituted an intervening opportunity for a college recruiter from Virginia, whereas it would have been an intervening supplier with respect to Florida, and a barrier to migration from Florida to Virginia.

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CONTRIBUTORS TO THIS ISSUE

Donald Brandes is an assistant professor of geography and planning at Southwest Texas State University. He received his Ph.D. and B.A. from the University of Florida, and his M.A. from the University of Calgary, Alberta.

Alan Craig is a professor of geography at Florida Atlantic University. His interests include biogeography and paleoecology. He received his doctorate from LSU in 1966.

Bruce E. Marti is an assistant professor of geography and marine affairs at the University of Rhode Island. His interests include maritime transport geography; port geography, planning, and policy; and economic geography. He received his Ph.D. from the University of Florida in 1982.

Harold McConnell is a professor of geography at The Florida State University. His interests include physical geography, quantitative methods, and the geography of sport. He received his Ph.D. from the University of Iowa.

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