75-36 Southwestern Flatlands

This lowland lake region includes barrier islands, Gulf coastal flatlands and valleys, and gently sloping coastal plain terraces at higher elevations. The elevations range from sea level to 150 feet. Much of the pine flatwoods and wet and dry grassland prairies have been converted to extensive areas of pasture, rangeland, and young citrus groves. Urban areas are growing rapidly near the coast. Lakes in this region can range from slightly acidic to alkaline, but almost all are eutrophic and have dark colored water. Some lakes near the Lake Wales/WinterHaven area appear more similar to the Lake Wales Ridge Transition (75-34) lakes, that is, with more moderate levels of nutrients and color, such as in South Crooked, Myrtle, and Lowery lakes in Polk County. The larger number of lakes shown in the phosphorus, nitrogen, chlorophyll-*a*, and Secchi columns in the table below are mostly from small ponds and waterbodies on Sanibel Island and from a small area south of Punta Gorda sampled in the Lakewatch program.

75-36 Southwestern Flatlands Lake Values

Mean Value	pH (lab) n=17	Total Alkalinity (mg/l) n=17	Conductivity (µS/cm@25°C) n=17	Total phosphorus (µg/l) n=44	Total Nitrogen (µg/l) n=42	Chlorophyll_a (µg/l) n=39	Color (pcu) n=16	Secchi (m) n=37
minimum	5.4	1.8	82	16	618	3	23	0.2
25th %	6.6	4.8	121	54	1245	11	60	0.4
median	**6.7**	**10.2**	**167**	**101**	**1662**	**34**	**91**	**0.7**
75th %	7.3	30.3	201	219	2182	52	125	1.2
maximum	8.6	76.0	319	564	3686	190	390	2.8

75-37 Immokalee Rise

This area of slightly elevated land, with elevations of 25-35 feet, includes the Immokalee Rise, Corkscrew Swamp, and Devils Garden physiographic subdistricts of Brooks (1981b; 1982). Pine flatwoods and wet prairies are dominant natural vegetation types. Geologic formations include Miocene-age Tamiami Formation sands and clays, and Pleistocene-age calcareous shelly sand of the Caloosahatchie Formation and clastic and shell deposits of the Fort Thompson Group (Brooks 1981a; Vernon and Puri 1964). Lake Trafford is the largest lake in the region. It was characterized as an alkaline, hardwater lake of high mineral content (Canfield 1981). There are few other lakes in the region, and these would tend to be small, swampy, and seasonal.

75-37 Immokalee Rise Lake Values

Lake	pH (lab)	Total Alkalinity (mg/l)	Conductivity (µS/cm@25°C)	Total phosphorus (µg/l)	Total Nitrogen (µg/l)	Chlorophyll_a (µg/l)	Color (pcu)	Secchi (m)
Trafford	8.5	111	225	65	1270	28	48	1.0

76-01 Everglades

This region begins south of Lake Okeechobee to include the Everglades Agricultural Area, the water conservation areas, and the sawgrass and sloughs of the national park.

The eastern and western boundaries of the region are from Griffith et al. (1995). The flat plain of saw-grass marshes, tree-islands, and marsh prairies, with cropland in the north, ranges in elevation from sea level to twenty feet. Peat, muck, and some clay are the main surficial materials over the limestone. Wide sloughs, marshes, and some small ponds contain most of the surface waters in this "River of Grass" region. Canals drain much of the water in some areas. No data for the small ponds were collected for this study.

76-02 Big Cypress

The Big Cypress is a flat region, 5 to 30 feet in elevation and slightly higher than the Everglades, covered by pine flatwoods, open scrub cypress, prairie type grasslands, and extensive marsh and wetlands. Poorly drained soils overlie limestone, calcareous sandstones, marls, swamp deposit mucks, and algal muds. Lakes are absent from the region.

76-03 Miami Ridge/Atlantic Coastal Strip

This is a heavily urbanized region, sea level to 25 feet in elevation, with coastal ridges on the east and flatter terrain to the west that grades into the Everglades. The western side originally had wet and dry prairie marshes on marl and rockland and sawgrass marshes (Davis 1967), but much of it now is covered by cropland, pasture, and suburbs. To the south, the Miami Ridge extends from near Hollywood south to Homestead and west into Long Pine Key of Everglades National Park. It is a gently rolling rock ridge of oolitic limestone that once supported more extensive southern slash pine forests as well as islands of tropical hardwood hammocks. The northern part of the region is occupied by the Green Acres Sand Prairie (Brooks 1981), a plain of pine flatwoods and wet prairie, and coastal sand ridges with scrub vegetation and sand pine. There are few natural lakes in the region, but three types of ponded surface waters occur: 1) Pits dug deep into underlying "rock" containing water that is clear, high pH and alkaline, with moderate nutrients; 2) Shallow, surficial dug drains that are darker water; and 3) flow-through lakes (e.g., Lake Osborne) that are colored and nutrient rich. Data for only two lakes were collected in this region, Osborne in Palm Beach County was sampled by Canfield (1981) and Lakewatch, and Tigertail in Broward County by Canfield (1981).

76-03 Miami Ridge/Atlantic Coastal Strip Mean Lake Values

Lake	pH (lab)	Total Alkalinity (mg/l)	Conductivity (µS/cm@25°C)	Total phosphorus (µg/l)	Total Nitrogen (µg/l)	Chlorophyll_a (µg/l)	Color (pcu)	Secchi (m)
Osborne	8.2	204	477	138	1168	40	60	1.0
Tigertail	8.9	66	166	14	607	2.5	4	-

76-04 Southern Coast and Islands

This region includes the Ten Thousand Islands and Cape Sable, the islands of Florida Bay, and the Florida Keys. It is an area of mangrove swamps and coastal marshes, coral reefs, various coastal strand type vegetation on beach ridge deposits and limestone rock islands. Although freshwater habitats are limited or non-existent in this region, any freshwater that does occur for periods of time may have great ecological significance.

Coastal rockland lakes are small in size and number, occurring primarily in the Florida Keys. With a limestone rock substrate, the waters are alkaline, with high mineral content and highly variable salinity levels. These rockland lakes provide important habitat for several kinds of fish, mammals, and birds of the Keys (Florida Natural Areas Inventory 1990). Reduction in the fresh groundwater lens that floats on the more dense saline groundwater can severely affect these lakes. Chemistry data for these lakes were not available for this study.

CONCLUSIONS AND RECOMMENDATIONS

The lakes of Florida contain a wide range of variation in their limnological characteristics. Similar to findings of other regional lake surveys, there is a strong relationship between the chemical composition of Florida's lakes and factors such as soils, physiography, and surficial geology. In addition to the natural variation of lake characteristics through time and space, a variety of human activities have modified surrounding landscapes, with certain modifications affecting some groups of lakes more than others. The lake region classification for Florida appears to be a useful framework for generalizing some of these complexities as an aid to lake resource assessment and management. It is a formalization of some commonly recognized regions in Florida and has similarities to several other frameworks of the state, but this framework is designed for the specific purpose of lake classification.

The interest in such a regional framework should be in its usefulness as a general stratifier, rather than with the potential correspondence of any single aquatic component. Does the framework and the associated data provide a mechanism to better understand the spatial variations in the characteristics and quality of Florida lakes? Does it help clarify the general limnological capabilities and potentials of these lakes? We believe this work is one piece of the foundation needed to achieve such lake management goals.

Modifications of the lake region framework might be warranted, however, as more information and understanding is gained. Aggregations of several upland regions, for example, might be useful for certain assessments. Small regions such as the Wimauma Lakes (75-29) might be excluded, while large regions such as the Eastern Flatlands (75-10) could be divided. Additional research will be needed to account for the natural variability within the lake regions. If the selected lakes in a region show a high range of variability, additional stratification or classification within the region may be necessary.

Regional maps of the parameters such as phosphorus and alkalinity that appear on the lake region poster, along with their associated histograms of the distribution of lakes, can

be useful in assessing issues such as eutrophication and acidification. With the continued growth of the UF lake database, along with other data sources, more precise maps of various lake parameters should be developed.

The hypothesis that a regional framework and some type of reference lake condition can give managers and scientists a better understanding of the spatial variations in the chemical, physical, and biological components of Florida lakes is intuitive but remains to be tested. Significant time and effort will be required for the collection and creative analysis of data to develop biological or chemical criteria and regional water quality standards, and to more fully understand attainable water conditions. The State of Florida continues to be a national leader in this effort.

Water cannot be viewed in isolation from its watershed and that is why holistic perspectives are important. Although watersheds and basins are useful study units for understanding certain aspects about the quantity and quality of water, it must be recognized that the spatial distribution of factors that affect water quantity and quality (such as vegetation, land cover, soils, geology, etc.), does not coincide with topographic watershed boundaries (Omernik and Griffith 1991). Watershed management or ecosystem management requires a spatial framework that considers the regional tolerances and capacities of landscapes. That is why the ecoregion framework and lake region framework can help in the DEP's ecosystem management approach.

Improving the quality of aquatic and terrestrial ecosystems in Florida will require the cooperation and coordination of local, state, and federal interests, both private and public. It is our hope that these regional frameworks will help improve communication and assessment within and among different groups and agencies. Although pollution of water bodies, fragmentation or loss of habitat, and alteration of landscapes have many causes, regional assessment tools can be valuable to both resource managers and researchers for stratifying natural variability and addressing the nature of these issues.

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APPENDIX A

LAKE REGION MAPS AND GRAPHS

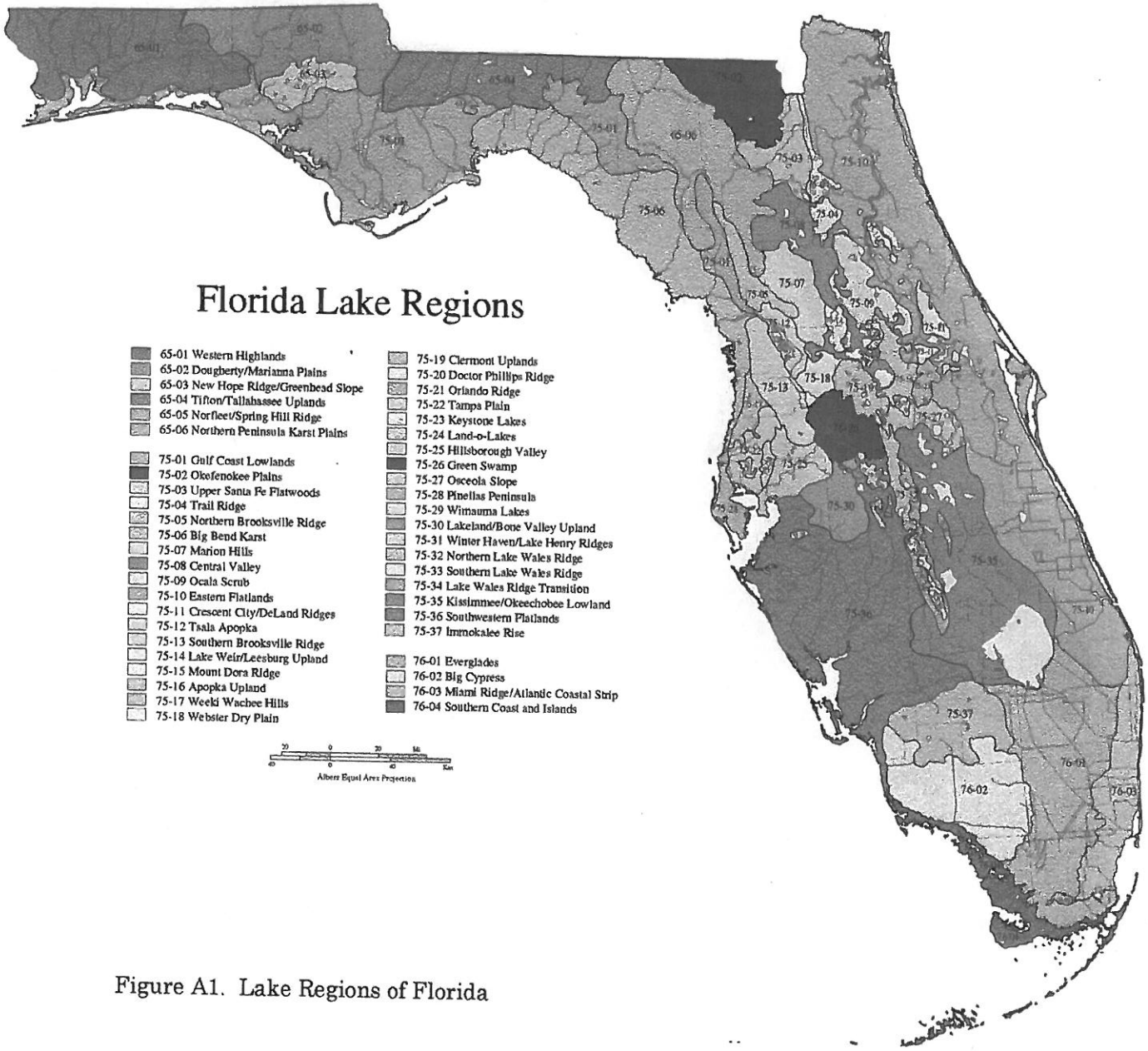

Figure A1. Lake Regions of Florida

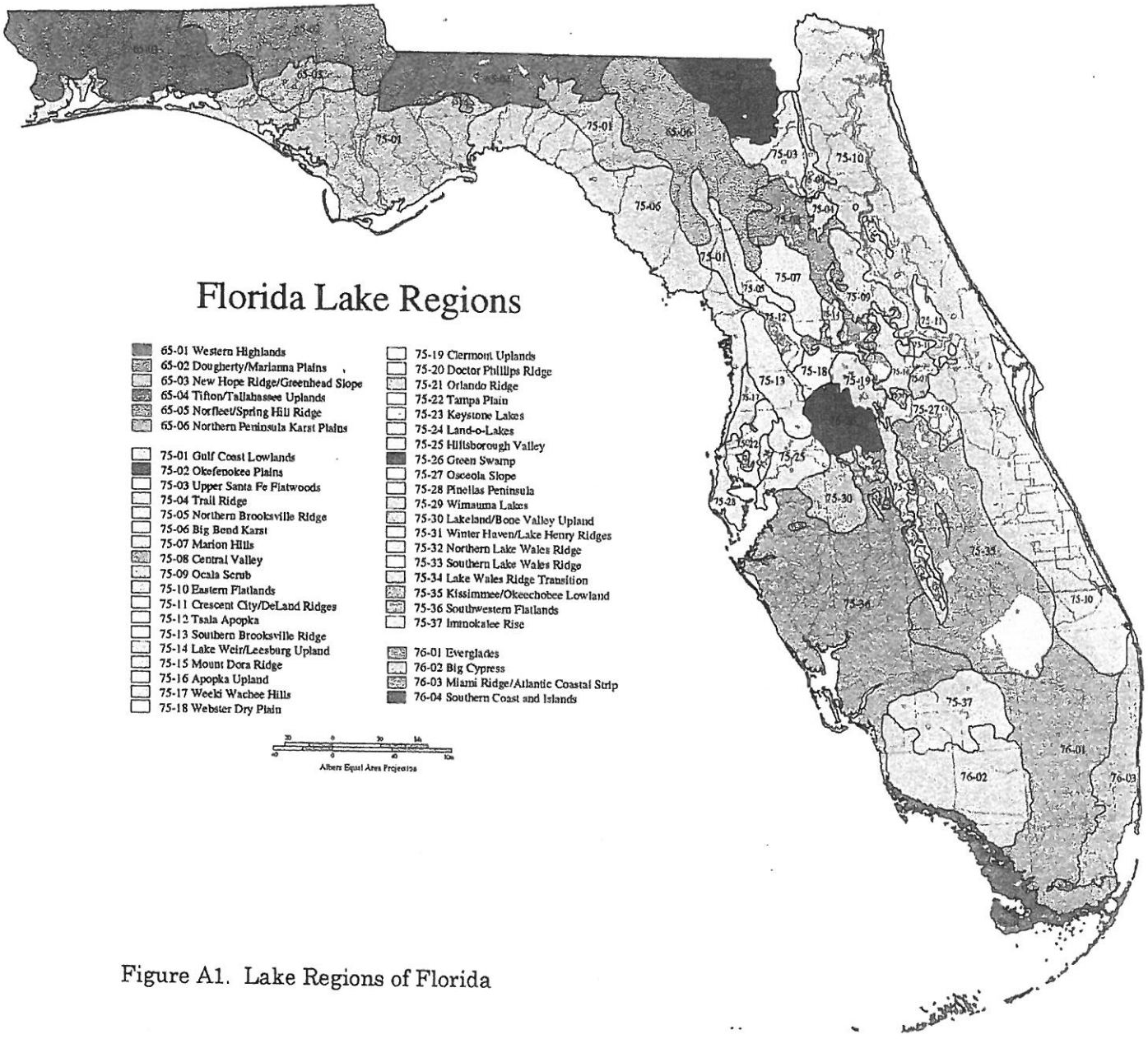

Figure A1. Lake Regions of Florida

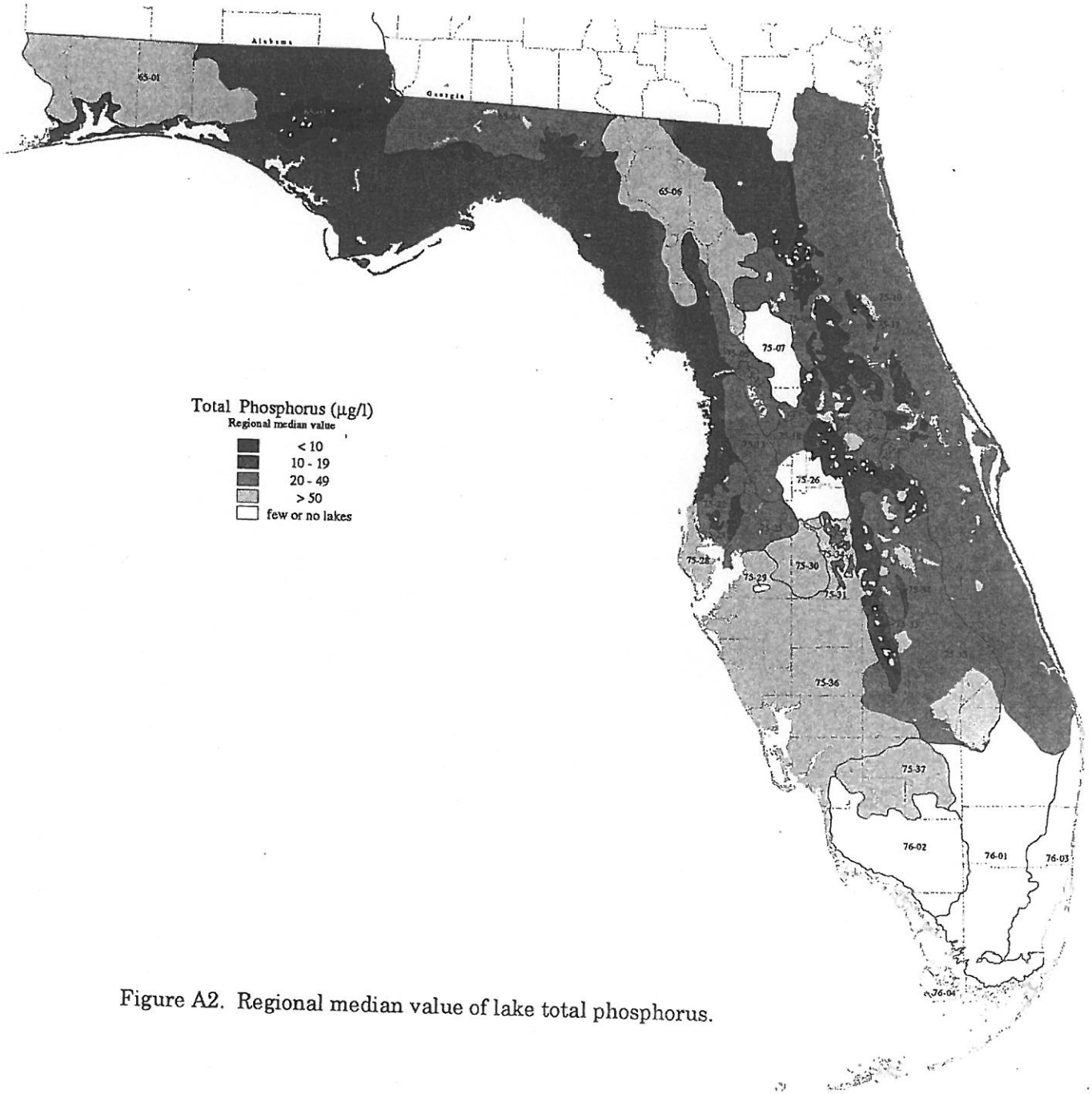

Figure A2. Regional median value of lake total phosphorus.

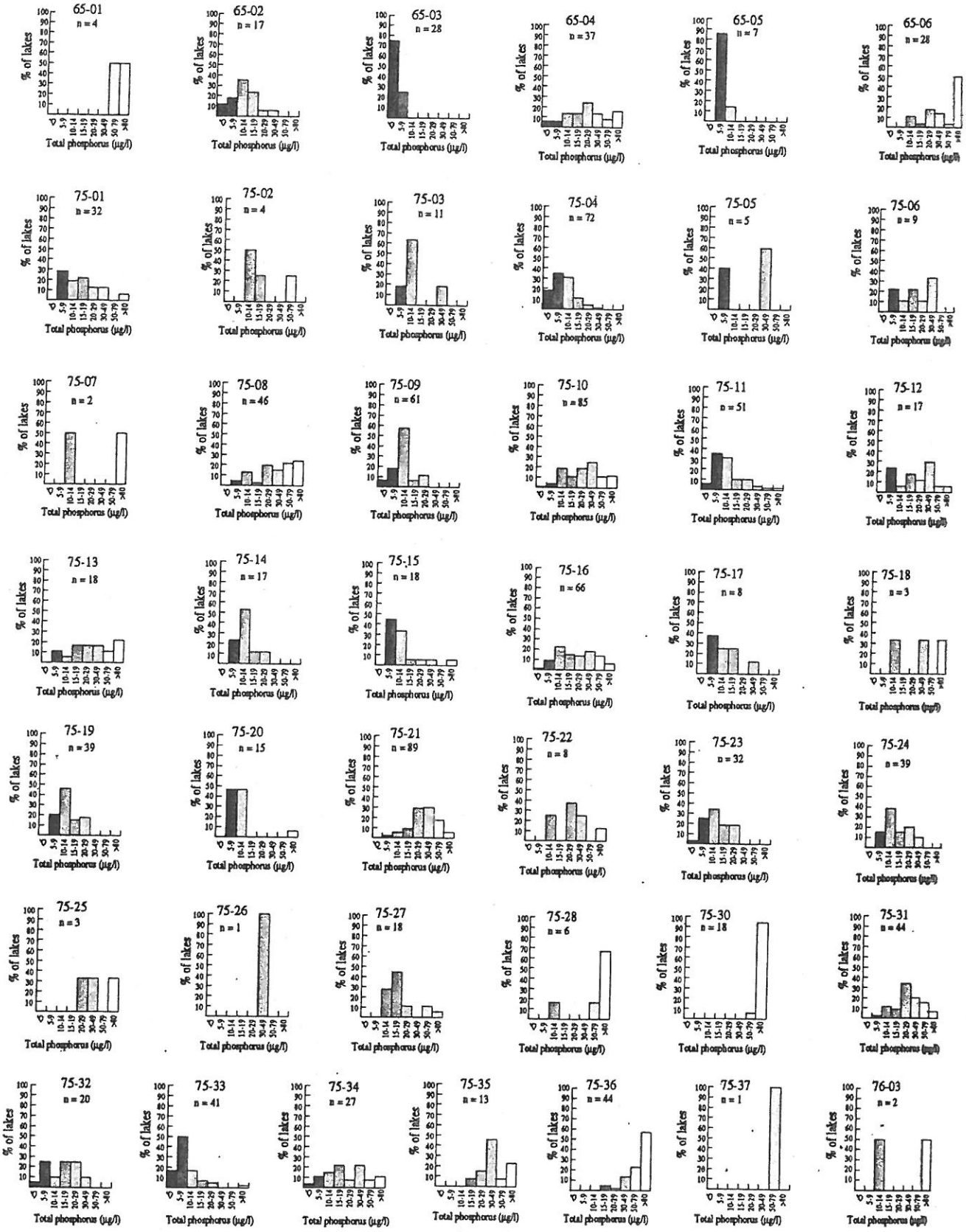

Figure A3. Distribution of lake phosphorus values by region (n=number of lakes sampled).

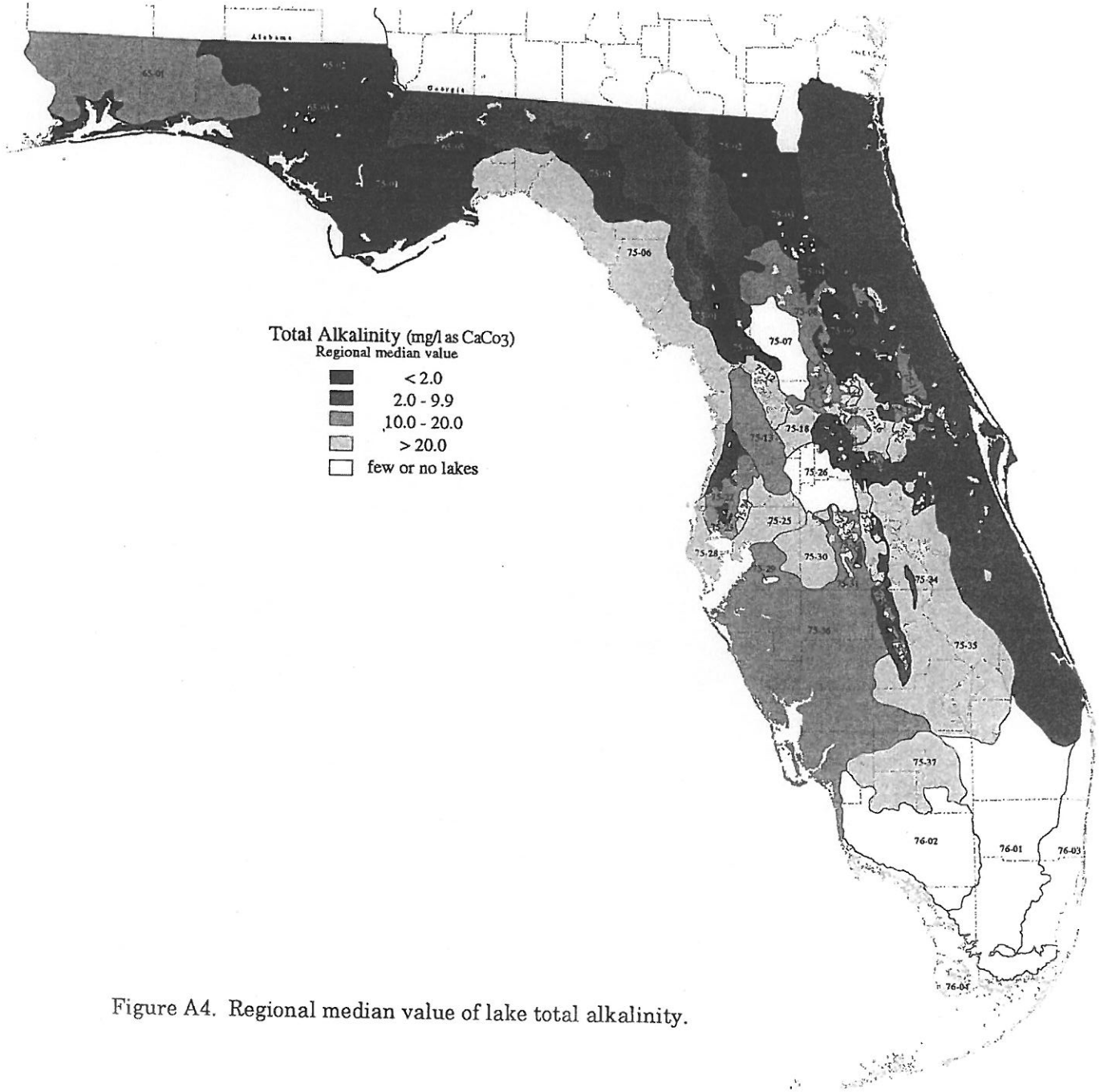

Figure A4. Regional median value of lake total alkalinity.

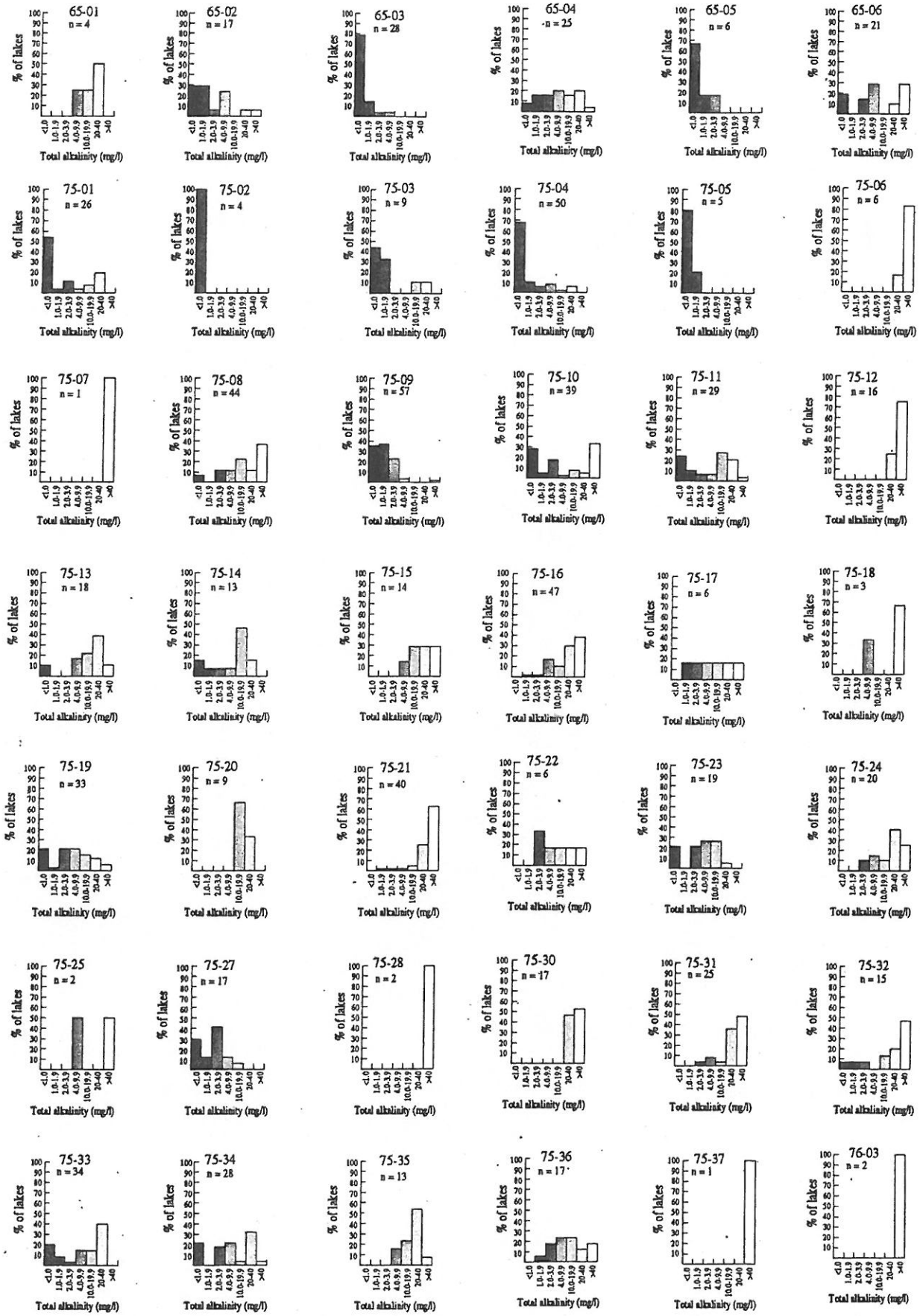

Figure A5 . Distribution of lake alkalinity values by region (n=number of lakes sampled).