Part III: Scoring Criteria for the Index of Biotic Integrity and the Index of Well-Being to Monitor Fish Communities in Wadeable Streams in the Apalachicola and Atlantic Slope drainage basins of the Southeastern Plains Ecoregion of Georgia

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Introduction

The Southeastern Plains ecoregion is the largest of the six Level III ecoregions found in Georgia (Part 1, Figure 1). It covers most of the southern portion of Georgia, bordering the Piedmont ecoregion to the north and the Southern Coastal Plain ecoregion to the southeast. It includes all or portions of 80 counties (Fig. 1), covering a land area of over 25,000 square miles (United States Census Bureau 2000). Major drainage basins found within the Southeastern Plains ecoregion include the Chattahoochee, Flint, Ocmulgee, Oconee, Altamaha, Ogeechee, Savannah, Satilla, Suwannee, and Ochlockonee.

The biotic indices developed by the GAWRD are based on the Level III ecoregion delineations (Griffith et al 2001). The metrics and scoring criteria have been developed from biomonitoring samples collected in the Chattahoochee, Flint, Ocmulgee, Oconee, Altamaha, Ogeechee, and the Savannah drainage basins. Based on similarities in species richness and composition, these seven drainages were aligned into two groups: the Apalachicola Drainage Basin (ACF), including the Chattahoochee and Flint drainage basins, and the Atlantic Slope Drainage Basins (AS), including the Altamaha, Ocmulgee, Oconee, Ogeechee, and Savannah drainage basins. Biotic indices have not yet been developed for streams in the Southeastern Plains ecoregion that are part of the Satilla, Suwanee, and Ochlockonee basins.

The GAWRD has sampled a total of 187 streams in the Southeastern Plains ecoregion. A total of 62 native species were collected in the Apalachicola Drainage Basins, and 58 were collected in the Atlantic Slope Drainage Basins. Three state listed species, ranked rare based on the Endangered Wildlife Act of 1973 (Georgia Department of Natural Resources, Non – Endangered Wildlife Program 1999), were collected in the Southeastern Plains ecoregion. These include the redeye chub (*Notropis harperi*), collected in the Chattahoochee, Flint, and Ocmulgee drainage basins, and the broadstripe shiner (*Pteronotropis euryzonus*) and the goldstripe darter (*Etheostoma parvipinne*), both collected in the Chattahoochee drainage basin. Table 1 shows a complete list of state listed fish found in the Apalachicola and Atlantic Slope drainage basins in the Southeastern Plains ecoregion.

Based on the IBI integrity classes (Part I, Table 2), 11 sites scored in the excellent class, 33 scored in the good class, 51 scored in the fair class, 41 scored in the poor class, and 51 scored in the very poor class. IBI scores in the Southeastern ecoregion ranged from a maximum of 56

to a minimum of 8. Similarly to the Piedmont ecoregion, nearly half of the streams sampled in the Southeastern Plains ecoregion scored in the poor and very poor integrity classes ([92 / 187] * 100 = 49.2%). Only 23% of the streams sampled in the Southeastern Plains ecoregion scored in the excellent and good integrity classes ([44 / 187] * 100 = 23.5%). Major impacts to streams in the Southeastern Plains ecoregion include the effects of groundwater irrigation, instream withdrawals, and erosion and sedimentation.

Table 2 shows the scoring criteria for the IBI metrics in the Apalachicola and Atlantic Slope drainage basins in the Southeastern Plains ecoregion. The Maximum Species Richness (MSR) graphs for the Apalachicola and Atlantic Slope drainage basins within the Southeastern Plains ecoregion are included in Appendix 1. Figures ACF1 - SEP through ACF6b - SEP depict the Maximum Species Richness (MSR) graphs used to score the species richness metrics (metrics 1 – 6b) in the Apalachicola drainage basin. Figures AS1 - SEP through AS6b - SEP depict the MSR graphs used to score the species richness metrics in the Atlantic Slope drainage basins. The fish list for the Apalachicola and Atlantic Slope drainage basins within the Southeastern Plains ecoregion showing the water quality tolerance rankings, feeding guilds, and species categories used in calculating the IBI score is also included in Appendix 1.

Based on the modified Index of Well-Being integrity classes for the Southeastern Plains ecoregion (Table 3), 12 sites scored in the excellent class, 31 scored in the good class, 66 scored in the fair class, 30 scored in the poor class, and 47 scored in the very poor class. Modified Iwb scores in headwater streams ranged from a maximum score of 8.94 to a minimum of 0.62. At larger wadeable streams, modified Iwb scores ranged from a maximum of 8.95 to a minimum of 0.37. There was a significant relationship between the two indices across the Southeastern Plains ecoregion ($r = 0.7772$, $p = 0.0000$, $N = 186$), although the relationship was stronger in the larger wadeable streams ($r = 0.8047$, $p = 0.0000$, $N = 116$) compared to the headwater streams ($r = 0.7372$, $p = 0.0000$, $N = 70$).

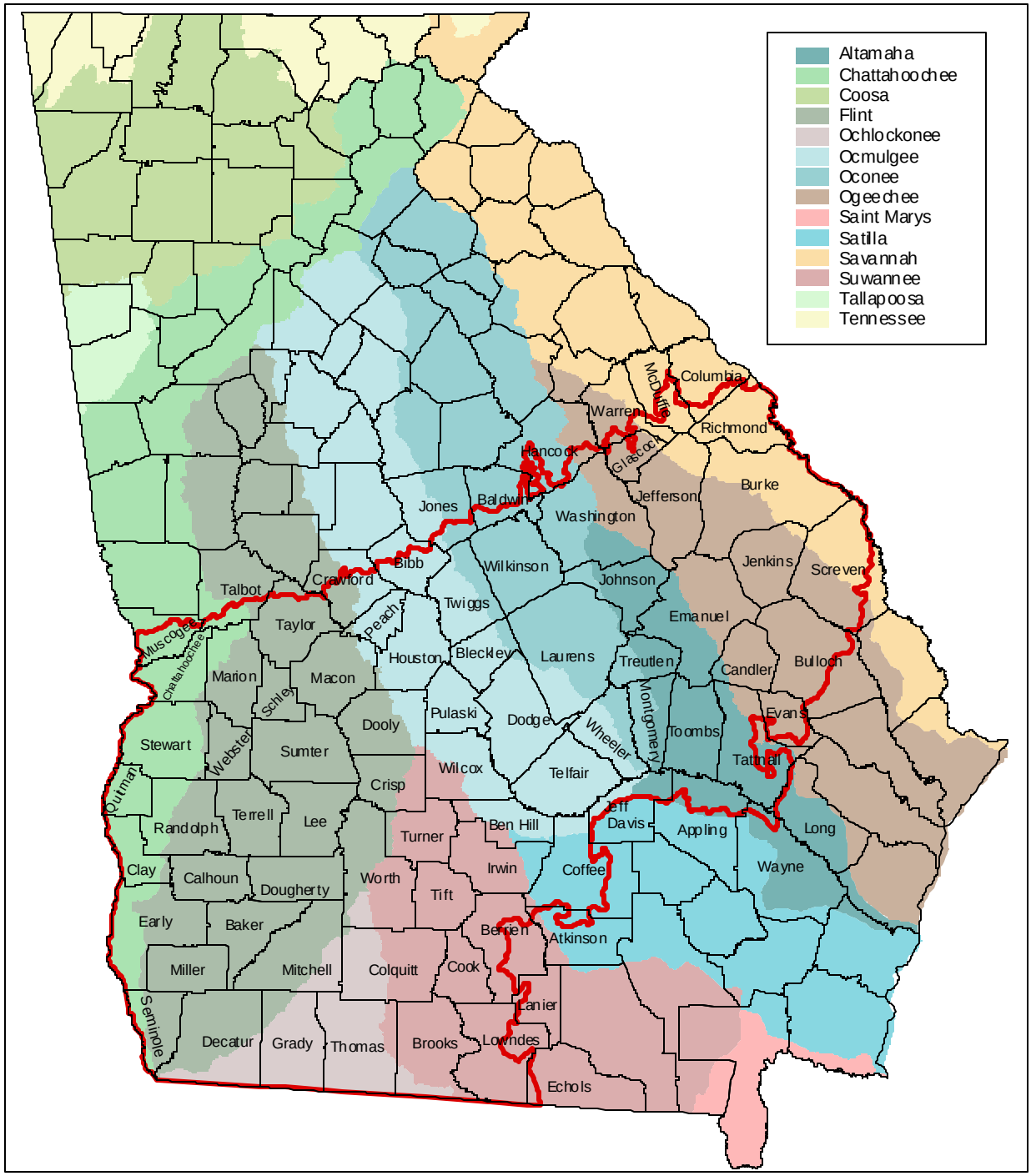


Figure 1. Level III Southeastern Plains ecoregion (outlined in bold red) in Georgia. Major drainage basins include the Chattahoochee, Flint, Ochlockonee, Suwanee, Satilla, Ocmulgee, Oconee, Altamaha, Ogeeechee, and Savannah.

Table 1. State listed fish found in the Apalachicola and Atlantic Slope drainage basins in the Southeastern Plains ecoregion of Georgia (Georgia Department of Natural Resources, Nongame – Endangered Wildlife Program, 1999).

Species	State Status	Federal Status	Bain
Shortnose Sturgeon *(Acipenser brevirostrum)*	E	E	ALT, OGE, SAV
Alabama Shad *(Alsoa alabamae)*	U	None	CHA, FLI
Spotted Bullhead *(Ameiurus serracanthus)*	R	None	CHA, FLI
Bluestripe Shiner *(Cyprinella callitaenia)*	T	None	CHA, FLI
Banded Sunfish *(Enneacanthus chaetodon)*	R	None	ALT, OCM OCO, OGE SAV
Goldstripe Darter *(Etheostoma parvipinne)*	R	None	CHA, FLI, OCM
Banded Topminnow *(Fundulus auroguttatus)*	R	None	CHA, FLI
Bluefin Killifish *(Lucania goodie)*	U	None	FLI
Robust Redhorse *(Moxostoma robustum)*	E	None	OCO, OGE SAV
Redeye Chub *(Notropis harperi)*	R	None	CHA, FLI, OCM, OCO
Highscale Shiner *(Notropis hypsilepis)*	T	None	CHA, FLI
Broadstripe Shiner *(Pteronotropis euryzonus)*	R	None	CHA
Bluenose Shiner *(Pteronotropis welaka)*	R	None	CHA, FLI

Status: E = endangered; R = rare; T = threatened; U = unusual
Basin: ALT = Altamaha; CHA = Chattahoochee; FLI = Flint; OCM = Ocmulgee; OCO = Oconee; OGE = Ogeechee; SAV = Savannah

Table 2. Index of Biotic Integrity metrics for wadeable streams in the Apalachicola and Atlantic Slope drainage basins in the Southeastern Plains ecoregion of Georgia.

Metric	Basin Group	Scoring Criteria		
1. Number of native species	ACF / AS	MSR Graphs		
2. Number of benthic invertivore species	ACF / AS	MSR Graphs		
3a. Number of native sunfish species[a]	ACF / AS	MSR Graphs		
3b. Number of native centrarchid species[b]	ACF / AS	MSR Graphs		
4. Number of native insectivorous cyprinid species	ACF / AS	MSR Graphs		
5. Number of native round-bodied sucker species	ACF / AS	MSR Graphs		
6a. Number of sensitive species[a]	ACF / AS	MSR Graphs		
6b. Number of Intolerant species[b]	ACF / AS	MSR Graphs		
		5	3	1
7. Evenness	ACF	≥ 77	77 - ≥ 69	< 69
	AS	≥ 72	72 - ≥ 63	< 63
8. % of individuals as *Lepomis* species	ACF	≤ 26	26 - ≤ 48	< 48
	AS	≤ 28	28 - ≤ 47	< 47
9. % of individuals as insectivorous cyprinids	ACF	≥ 50	50 - ≥ 27	< 27
	AS	≥ 46	46 - ≥ 23	< 23

		5	3	1
10a. % of individuals as generalist feeders and herbivores	ACF / AS	≤ 16	16 - ≤ 31	< 31
10b. % of individuals as top carnivores[b]	ACF	≥ 4.2 - ≤ 10.5	≥ 2.1 – 4.2 or 10.5 - ≤ 12.6	< 2.1 or > 12.6
	AS	≥ 4.4 - ≤ 11.0	≥ 2.2 – 4.4 or 11.0 - ≤ 13.2	< 2.2 or > 13.2
11. % of individuals as benthic fluvial specialist	ACF	≥ 33	33 - ≥ 18	< 18
	AS	≥ 17	17 - ≥ 9	< 9
12. Number of individuals per 200 meters	ACF	≥ 340	340 - ≥ 170	< 170
	AS	≥ 370	370 - ≥ 185	< 185
13. % of individuals with external anomalies	ACF / AS	> 1.2 – subtract 4 points from total score		

[a] used at sites with an upstream drainage basin area < 15 square miles
[b] used at sites with an upstream drainage basin area ≥ 15 square miles

Table 3. Index of well-being scoring criteria and integrity classes for wadeable streams in the Apalachicola and Atlantic Slope drainage basins in the Southeastern Plains ecoregion of Georgia.

Iwb Score	DBA (Sq. miles)	Integrity Class	Attributes
$\geq$ 8.0	< 15	Excellent	Comparable to the best regional reference conditions; all regionally expected species for the habitat and stream size, including the most intolerant species, are present with a full array of size classes; healthy species diversity within the fish community, indicated by elevated evenness scores; number of individuals abundant; total biomass is high, with each level of the food web represented, indicating a balanced trophic structure.
$\geq$ 8.4	$\geq$ 15		
8.0 - $\geq$ 7.3	< 15	Good	Species richness somewhat below expectation; evenness scores decrease as species diversity falls, especially due to the loss of the most intolerant forms; good number of individuals in the sample, with several species of benthic fluvial specialist and insectivorous cyprinids present; some decreases in total biomass as trophic structure shows some signs of stress.
8.4 - $\geq$ 7.8	$\geq$ 15		
7.3 - $\geq$ 5.9	< 15	Fair	Species richness and diversity decline as some expected species are absent; abundance of individuals declines; total biomass continues to decline as some levels of the food web in low abundance or missing; trophic structure skewed toward generalist feeders and/or *Lepomis* species as the abundance of insectivorous cyprinid and benthic fluvial specialist species decreases.
7.8 - $\geq$ 6.6	$\geq$ 15		
5.9 - $\geq$ 5.2	< 15	Poor	Number of individuals is low; species richness and diversity are very low, with benthic fluvial specialist and insectivorous cyprinid species in low abundance or absent; sample dominated by generalist feeders, herbivores, and *Lepomis* species; increase in the proportions of non-native species and hybrids; growth rates depressed as sample is heavily skewed to the smaller size classes; total biomass low.
6.6 - $\geq$ 6.0	$\geq$ 15		
< 5.2	< 15	Very Poor	Sample represented by few individuals, mainly generalist feeders and *Lepomis* species; some sites dominated by non-native species; total biomass very low.
< 6.0	$\geq$ 15		

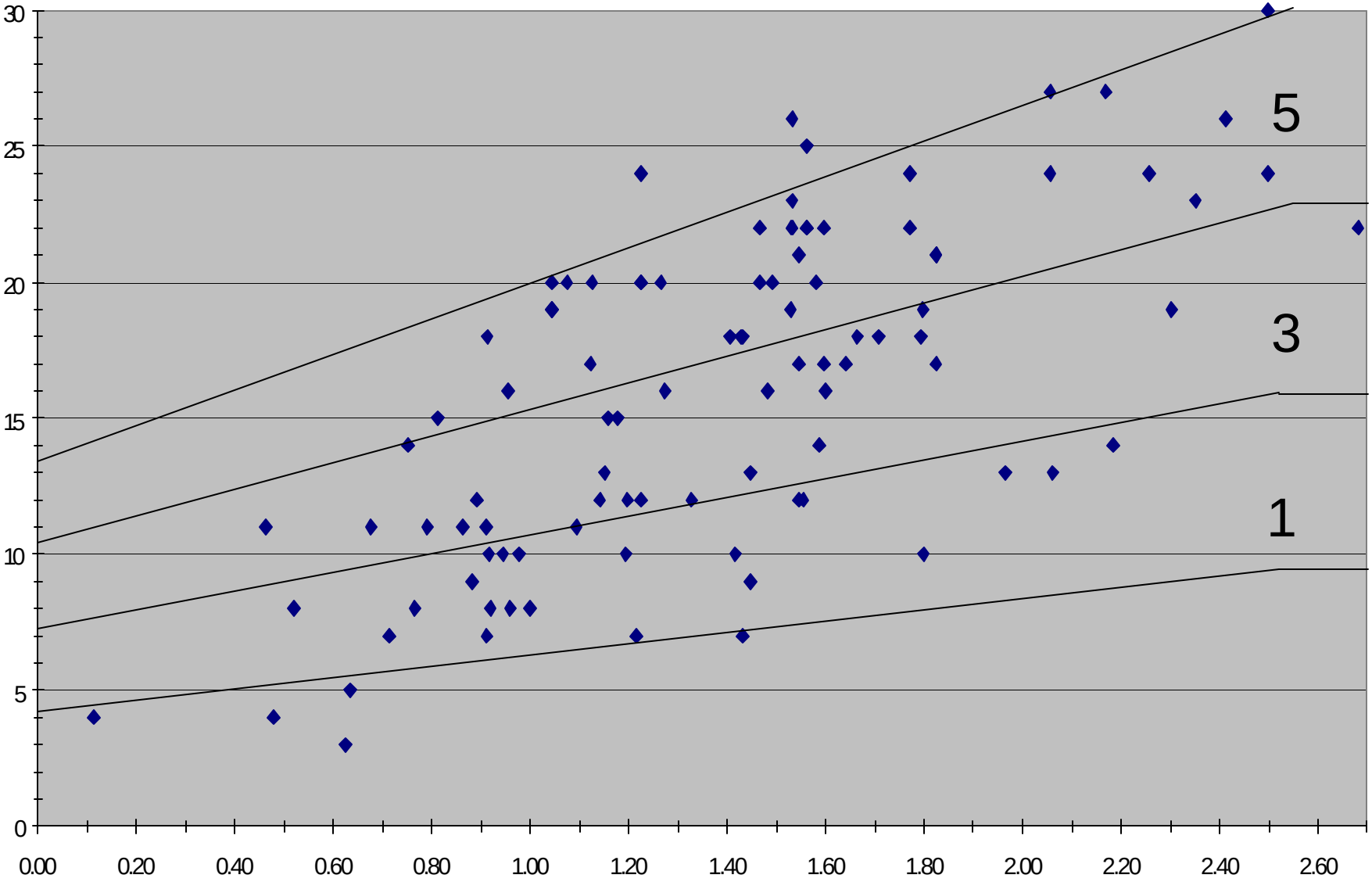
References

Georgia Department of Natural Resources, Wildlife Resources Division. 1999. Protected Animals of Georgia. Nongame Wildlife – Natural Heritage Section, Forsyth, Georgia.

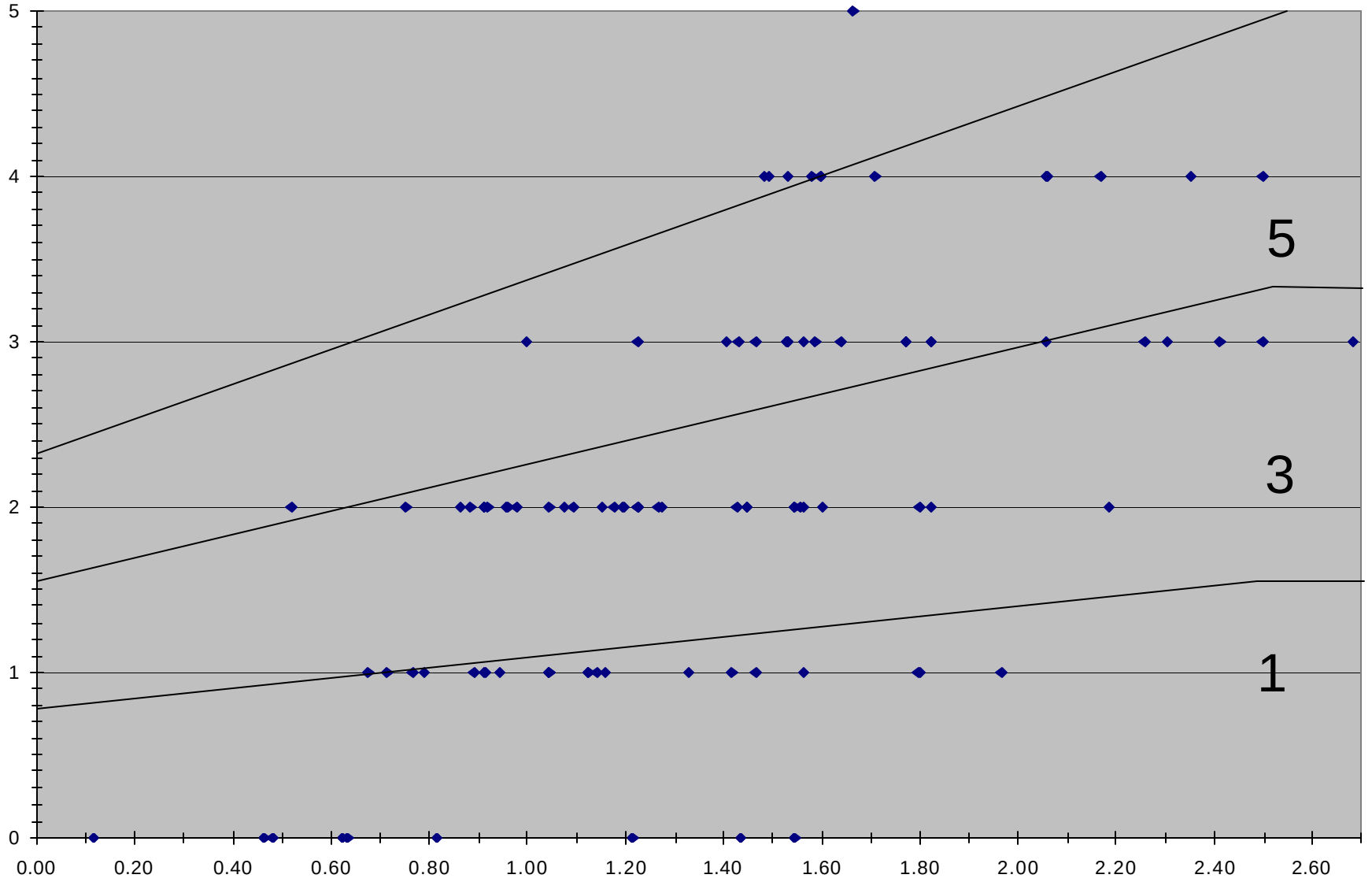
Griffith, G.E., J.M. Omernik, J.A. Comstock, S. Lawrence, and T. Foster. 2001. Level III and IV Ecoregions of Georgia, (color poster with map, descriptive text, summary tables, and photographs). Reston, Virginia, U.S. Geological Survey.

United States Census Bureau. 2000. 2000 Census of Population and Housing. United States Census Bureau, Washington, D.C.

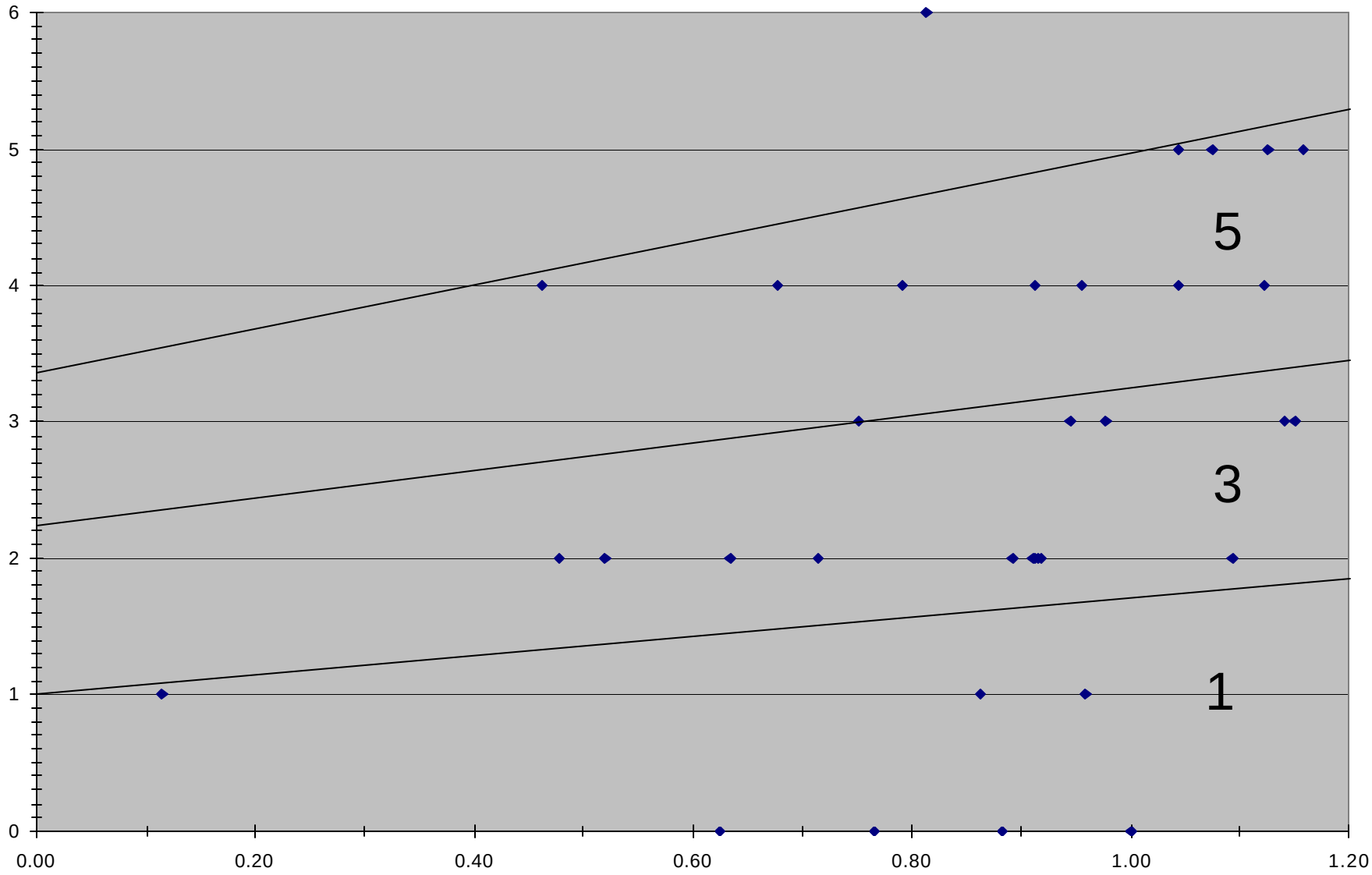
Appendix 1



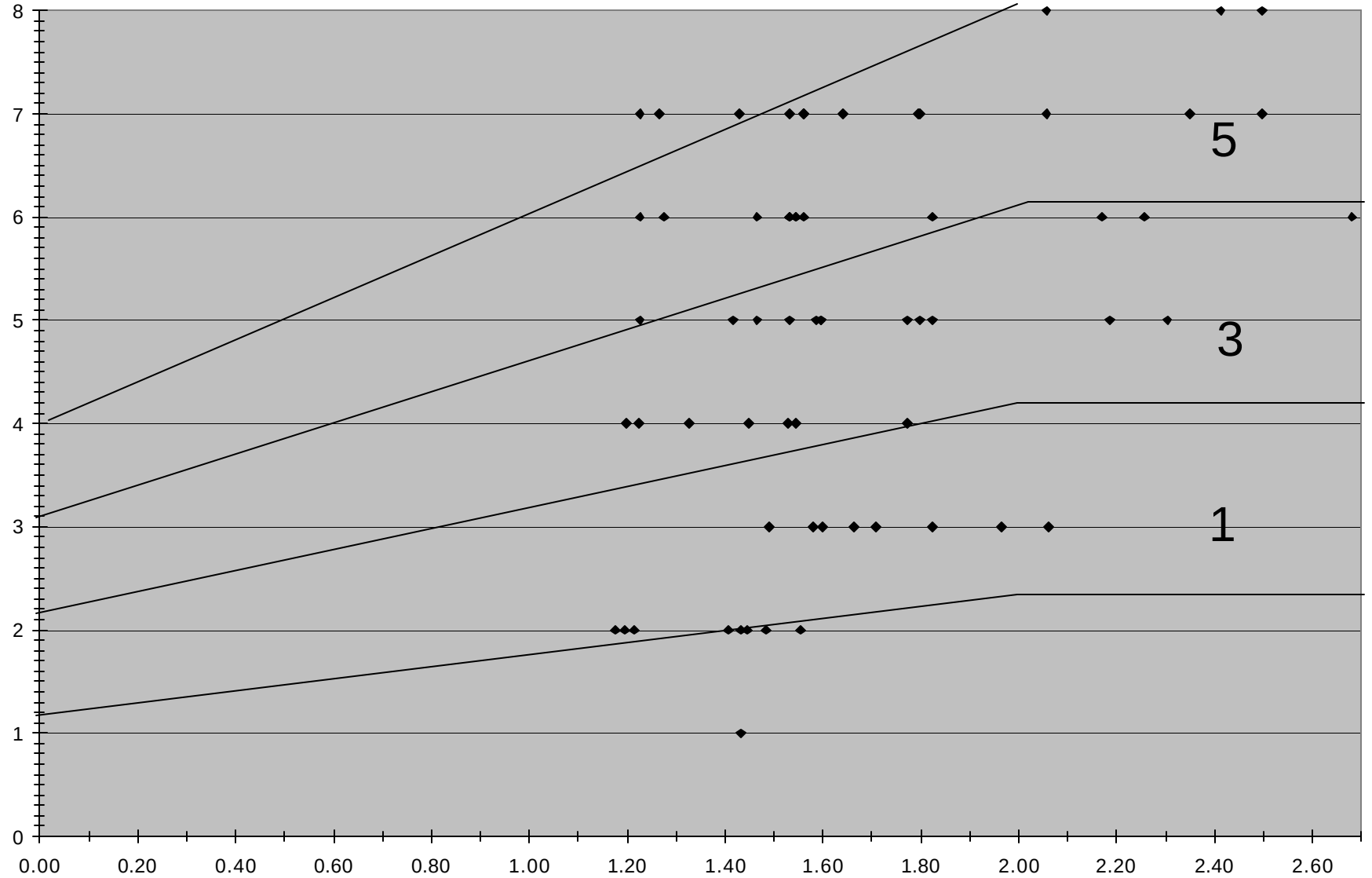
ACF1 – SEP. Total number of native species in the Southeastern Plains ecoregion of the Apalachicola drainage basin plotted against the log (base 10) transformed value of the drainage basin area (square miles). Flatlines at 300 square miles. Total samples equal 98.



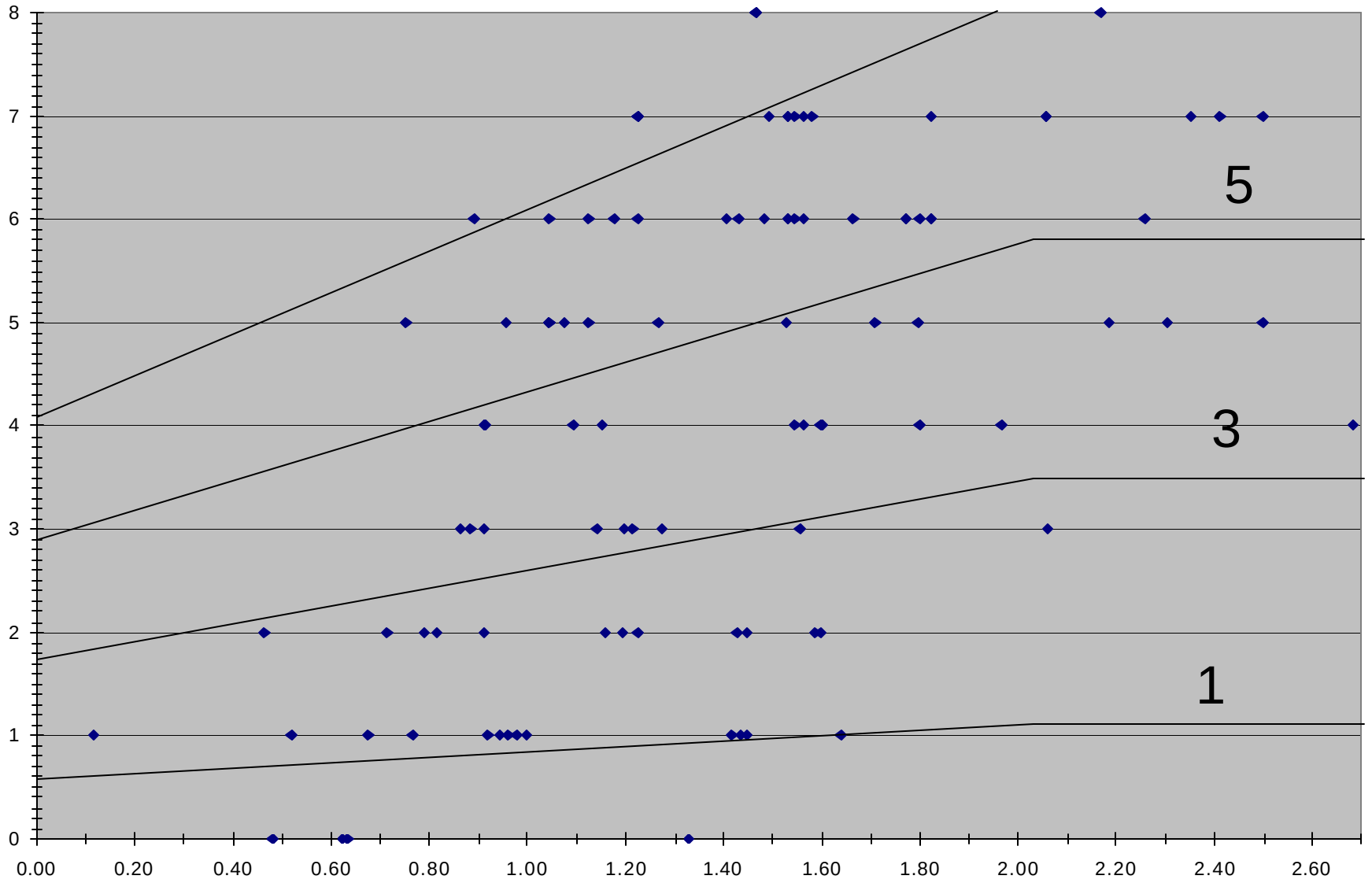
ACF2 – SEP. Number of benthic invertivore species in the Southeastern Plains ecoregion of the Apalachicola drainage basin plotted against the log (base 10) transformed value of the drainage basin area (square miles). Flatlines at 300 square miles. Total samples equal 98.



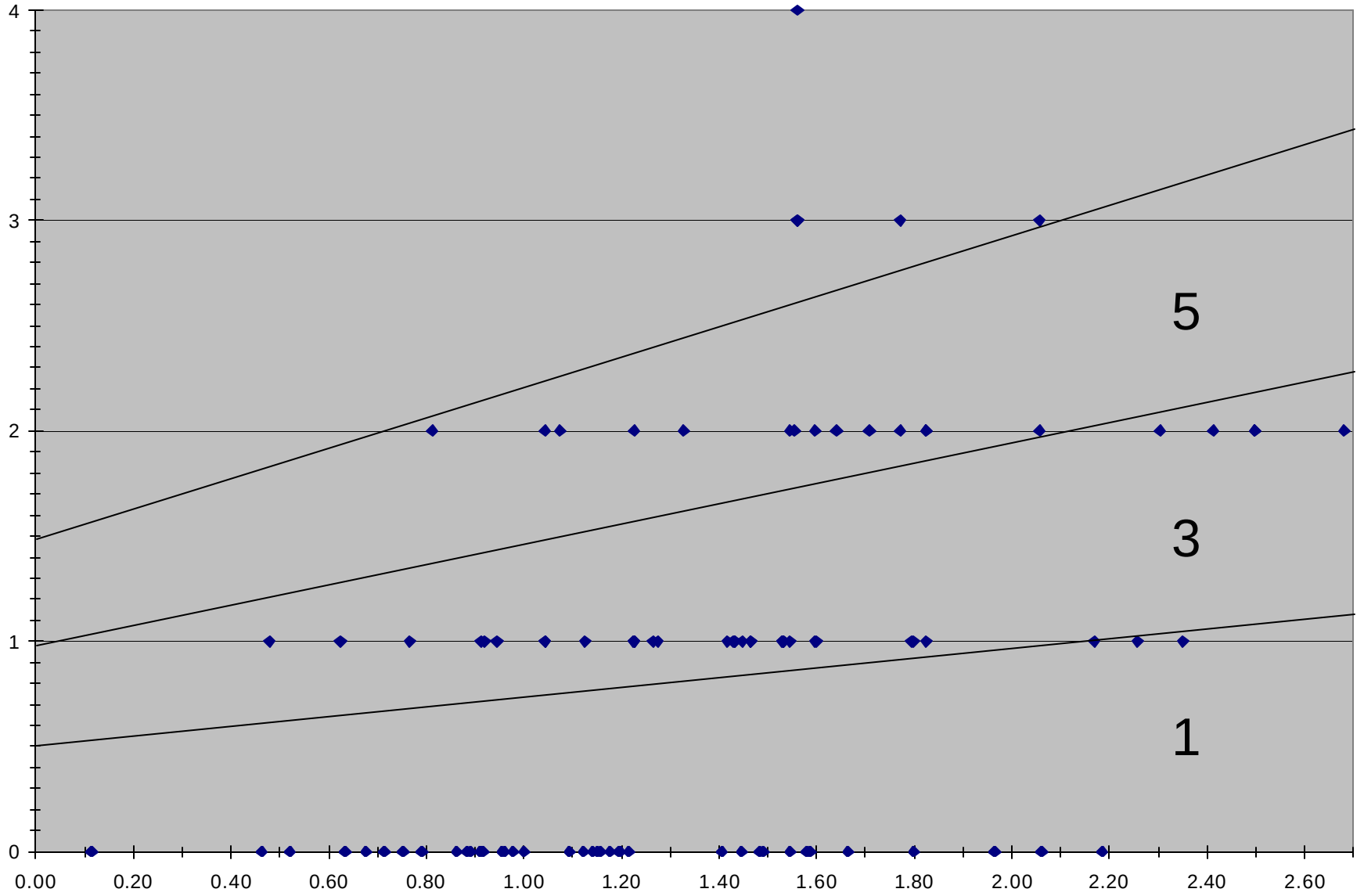
ACF3a – SEP. Number of native sunfish species in headwater streams (<15 square mile drainage basin area) in the Southeastern Plains ecoregion of the Apalachicola drainage basin plotted against the log (base 10) transformed value of the drainage basin area (square miles). Total samples equal 35.



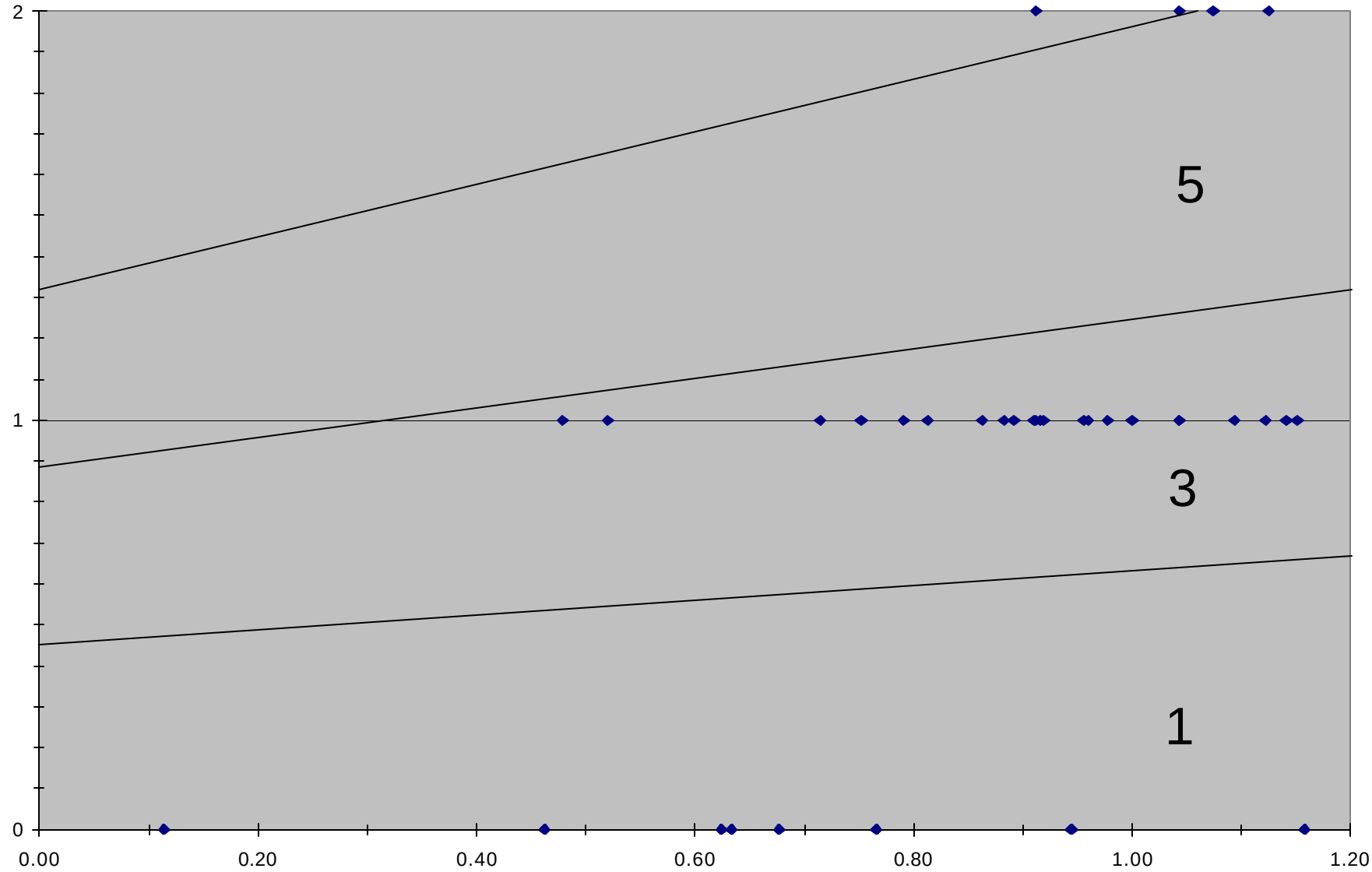
ACF3b – SEP. Number of native centrarchid species in the Southeastern Plains ecoregion of the Apalachicola drainage basin plotted against the log (base 10) transformed value of the drainage basin area (square miles). Flatlines at 100 square miles. Total samples equal 63.



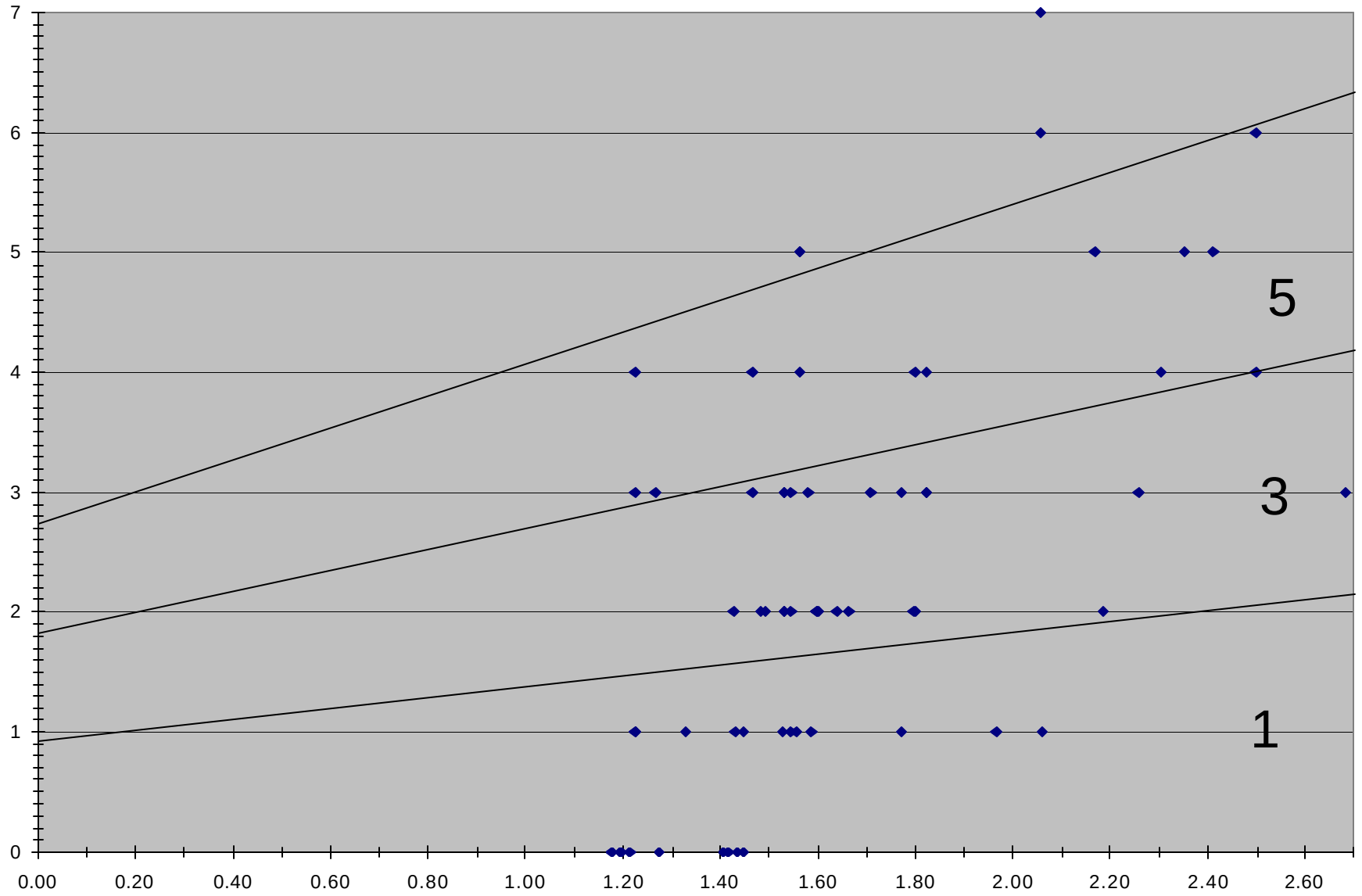
ACF4 – SEP. Number of native insectivorous cyprinid species in the Southeastern Plains ecoregion of the Apalachicola drainage basin plotted against the bg (base 10) transformed value of the drainage basin area (square miles). Flatlines at 100 square miles. Total samples equal 98.



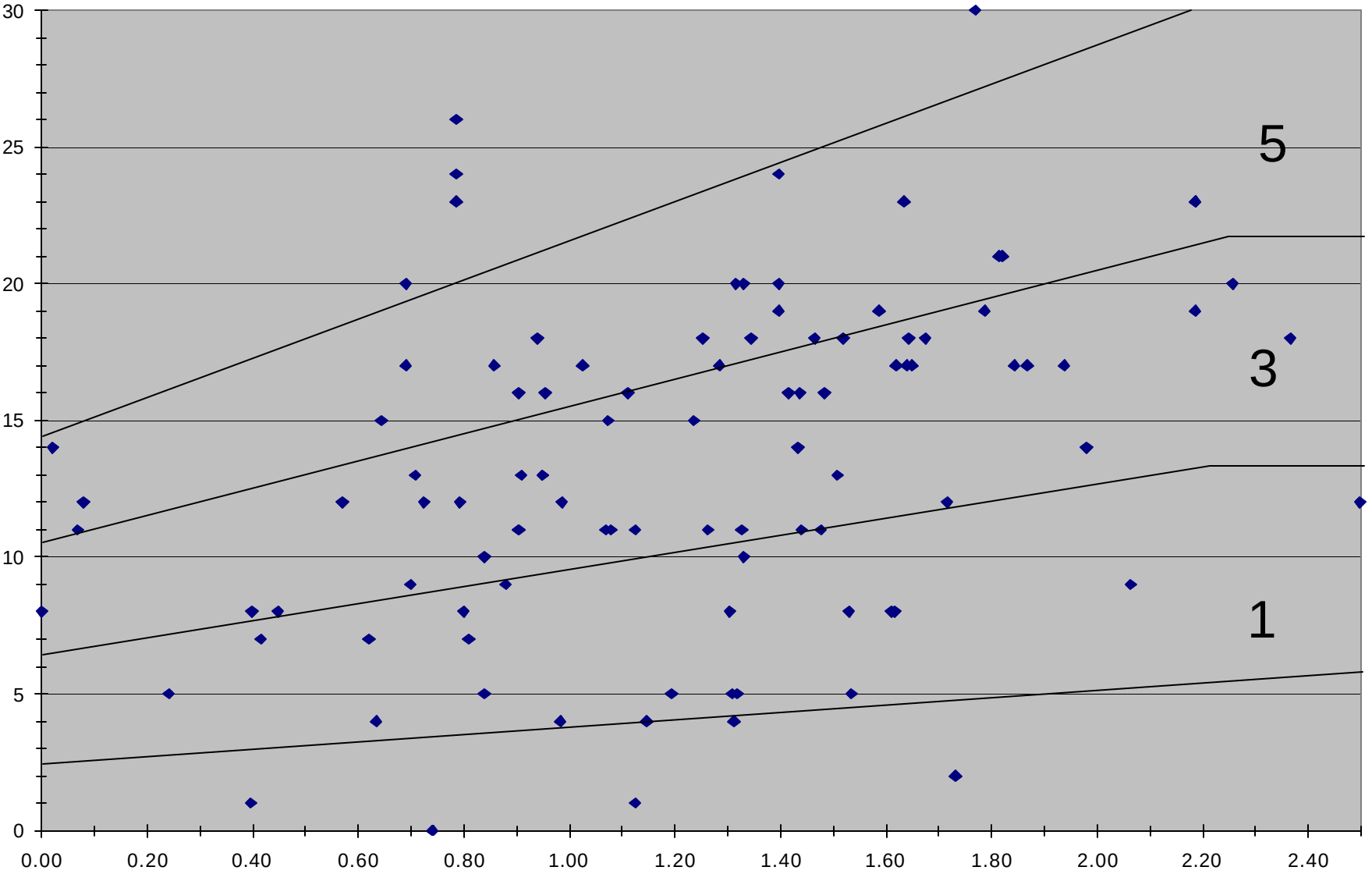
ACF5 – SEP. Number of native round bodied-sucker species in the Southeastern Plains ecoregion of the Apalachicola drainage basin plotted against the log (base 10) transformed value of the drainage basin area (square miles). Total samples equal 98.



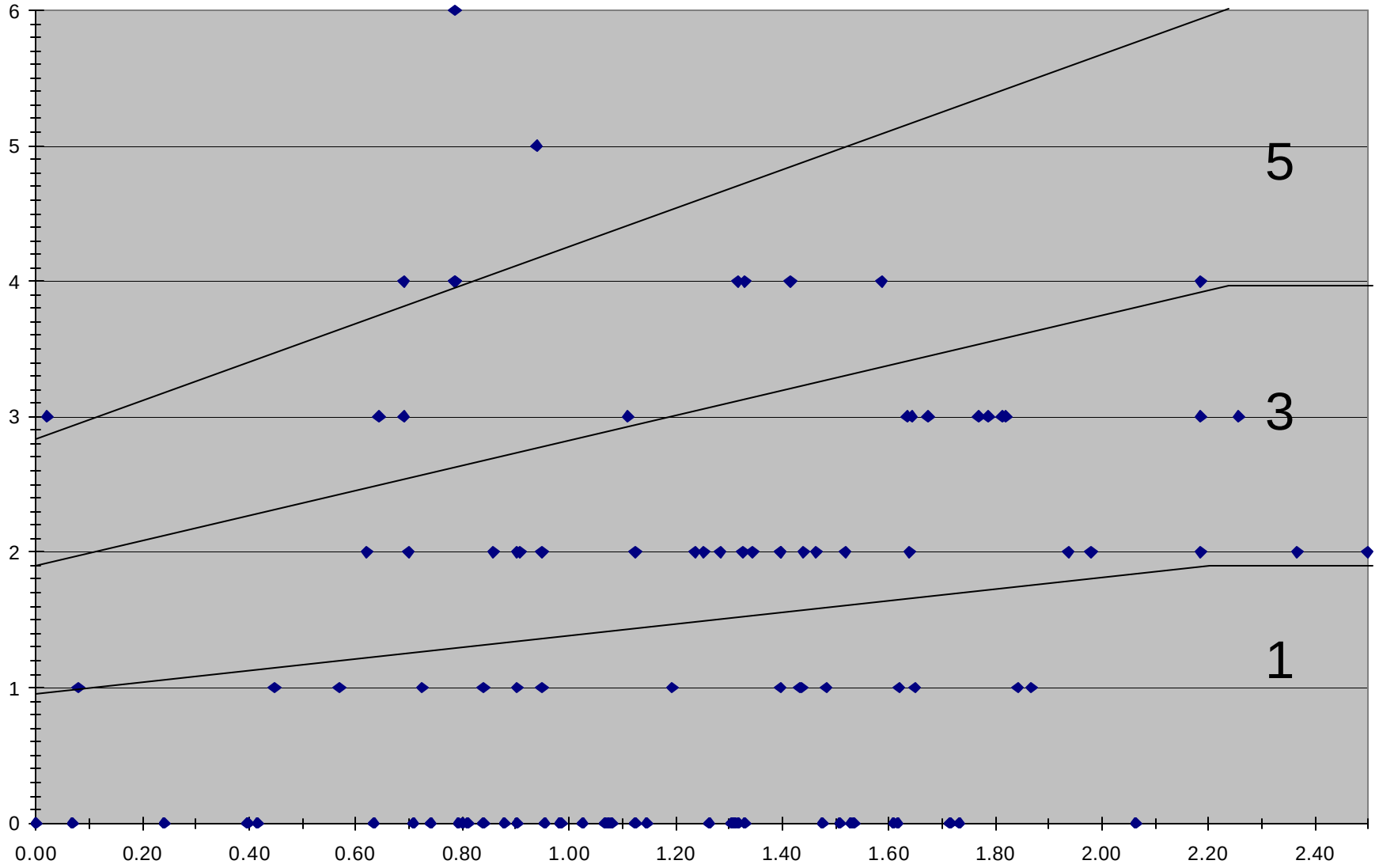
ACF6a – SEP. Total number of species ranked as sensitive at headwater sites (<15 square miles drainage basin area) in the Southeastern Plains ecoregion of the Apalachicola drainage basin plotted against the log (base 10) transformed value of the drainage basin area (square miles). Total samples equal 98.



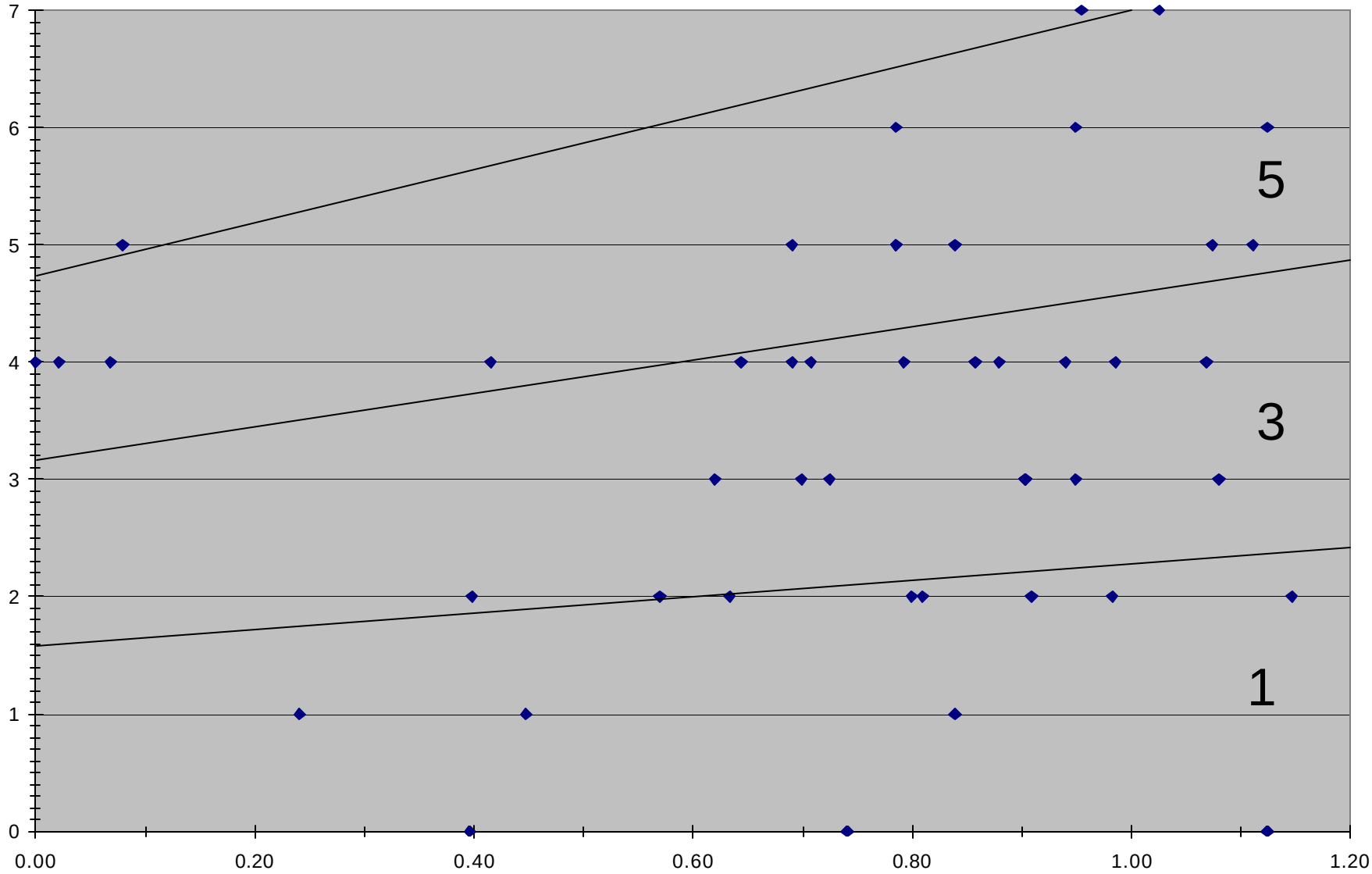
ACF6b – SEP. Number of species ranked as intolerants in the Southeastern Plains ecoregion of the Apalachicola drainage basin plotted against the log (base 10) transformed value of the drainage basin area (square miles). Total samples equal 35.



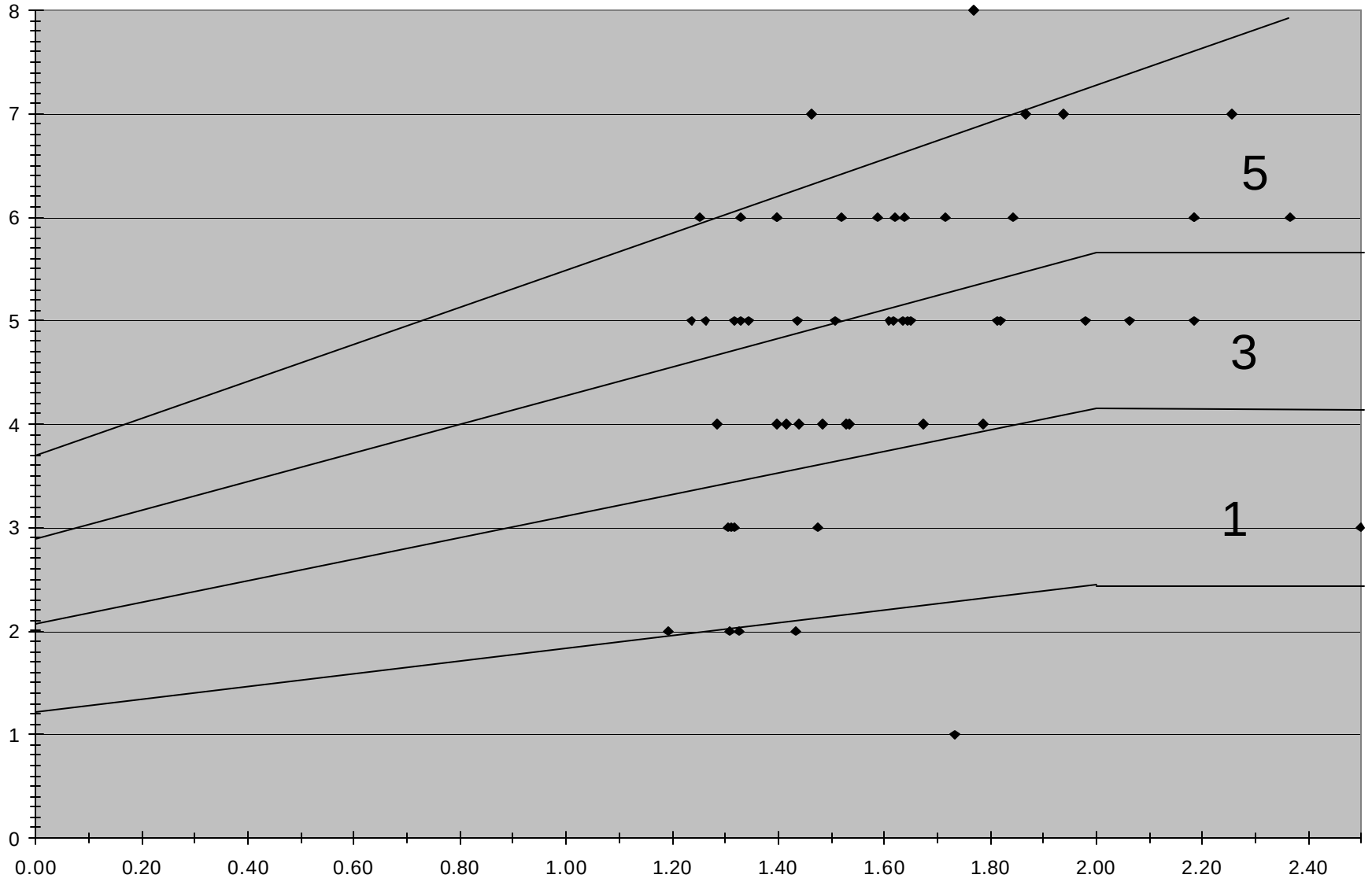
AS1 – SEP. Total number of native species in the Southeastern Plains ecoregion of the Atlantic Slope drainage basins plotted against the log (base 10) transformed value of the drainage basin area (square miles). Flatlines at 150 square miles. Total samples equal 101.



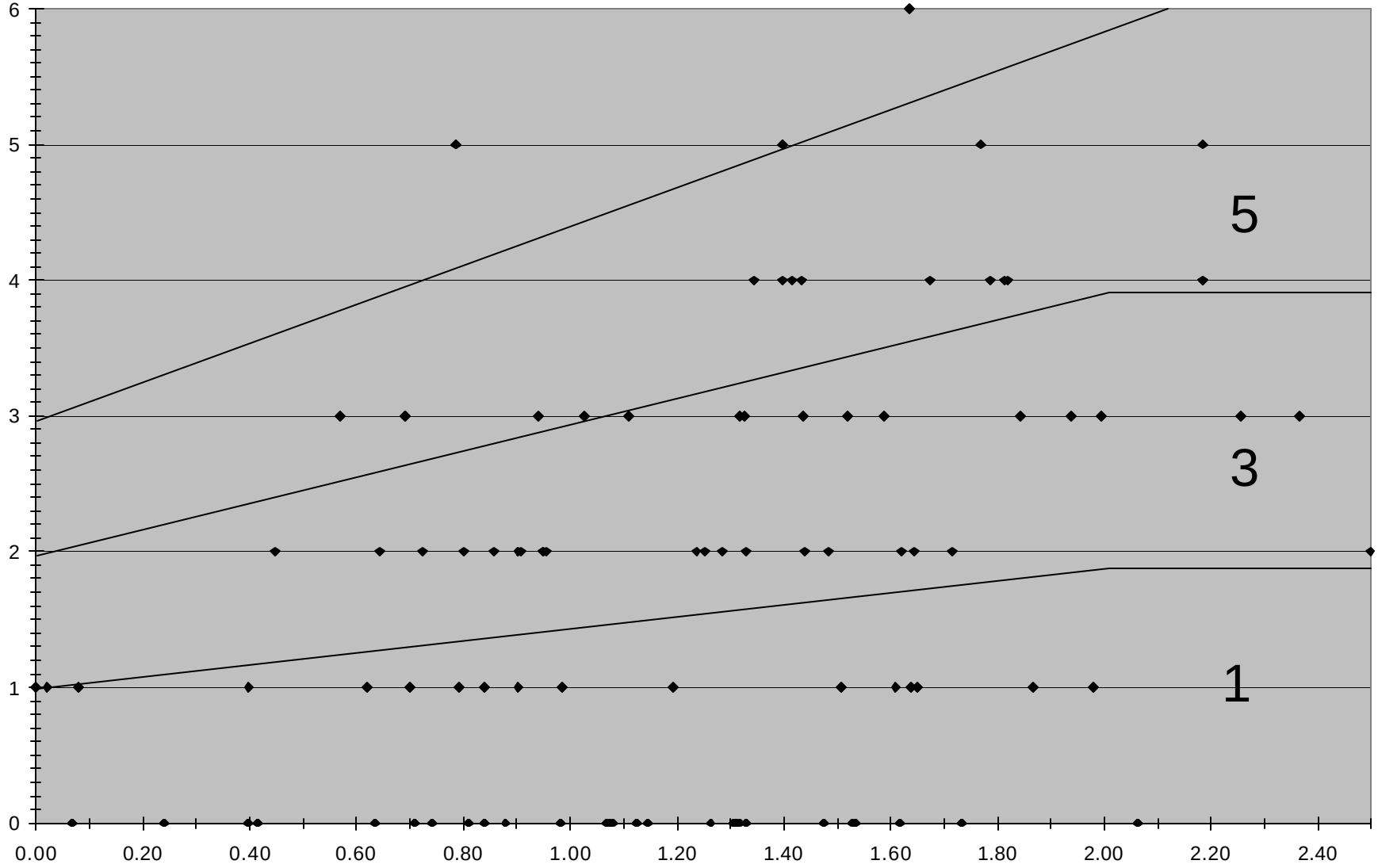
AS2 – SEP. Number of benthic invertivore species in the Southeastern Plains ecoregion of the Atlantic Slope drainage basins plotted against the log (base 10) transformed value of the drainage basin area (square miles). Flatlines at 150 square miles. Total samples equal 101.



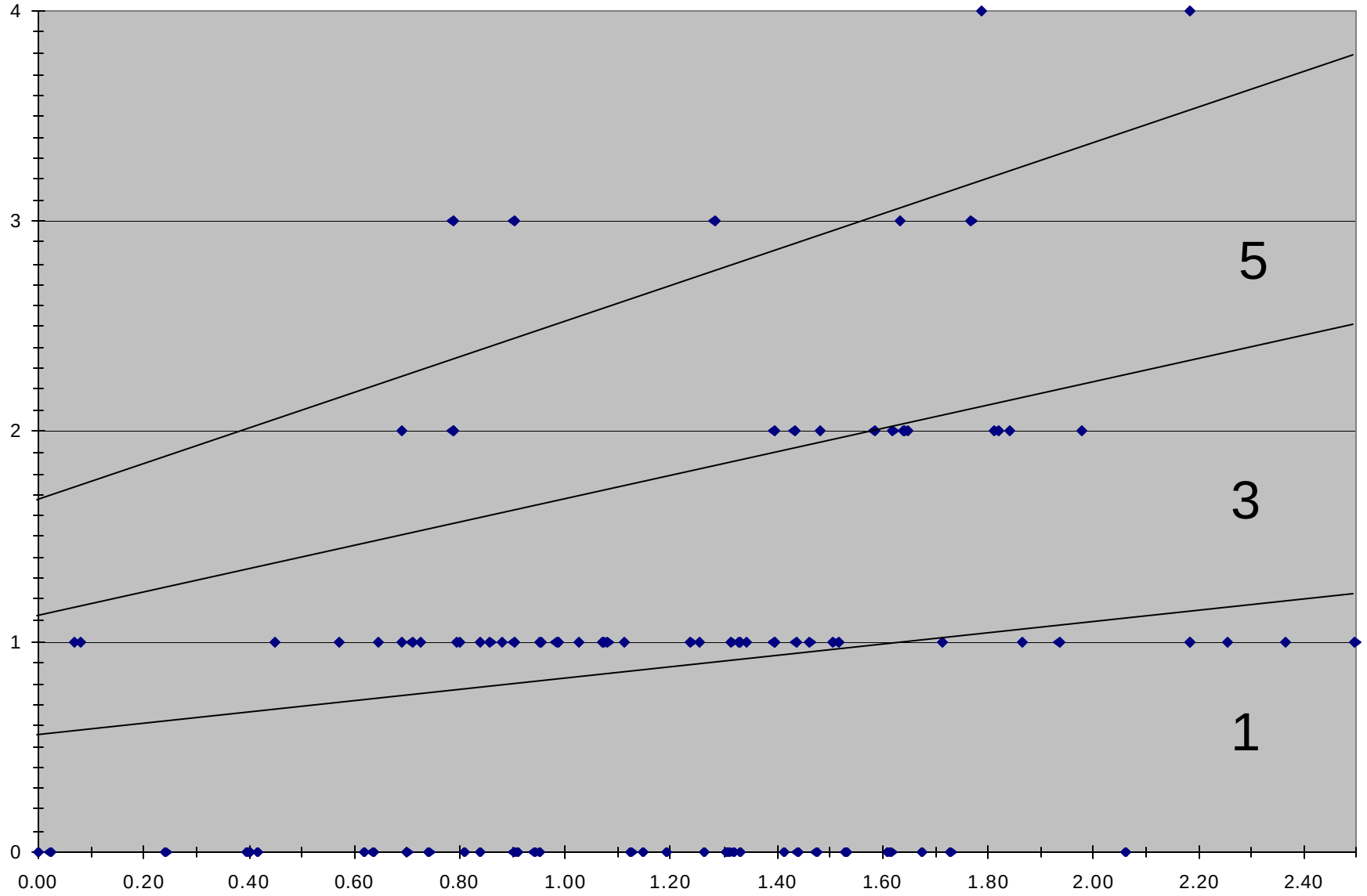
AS3a - SEP. Number of native sunfish species in headwater streams (<15 square miles drainage basin area) in the Southeastern Plains ecoregion of the Atlantic Slope drainage basins plotted against the log (base 10) transformed value of the drainage basin area (square miles). Total samples equal 47.



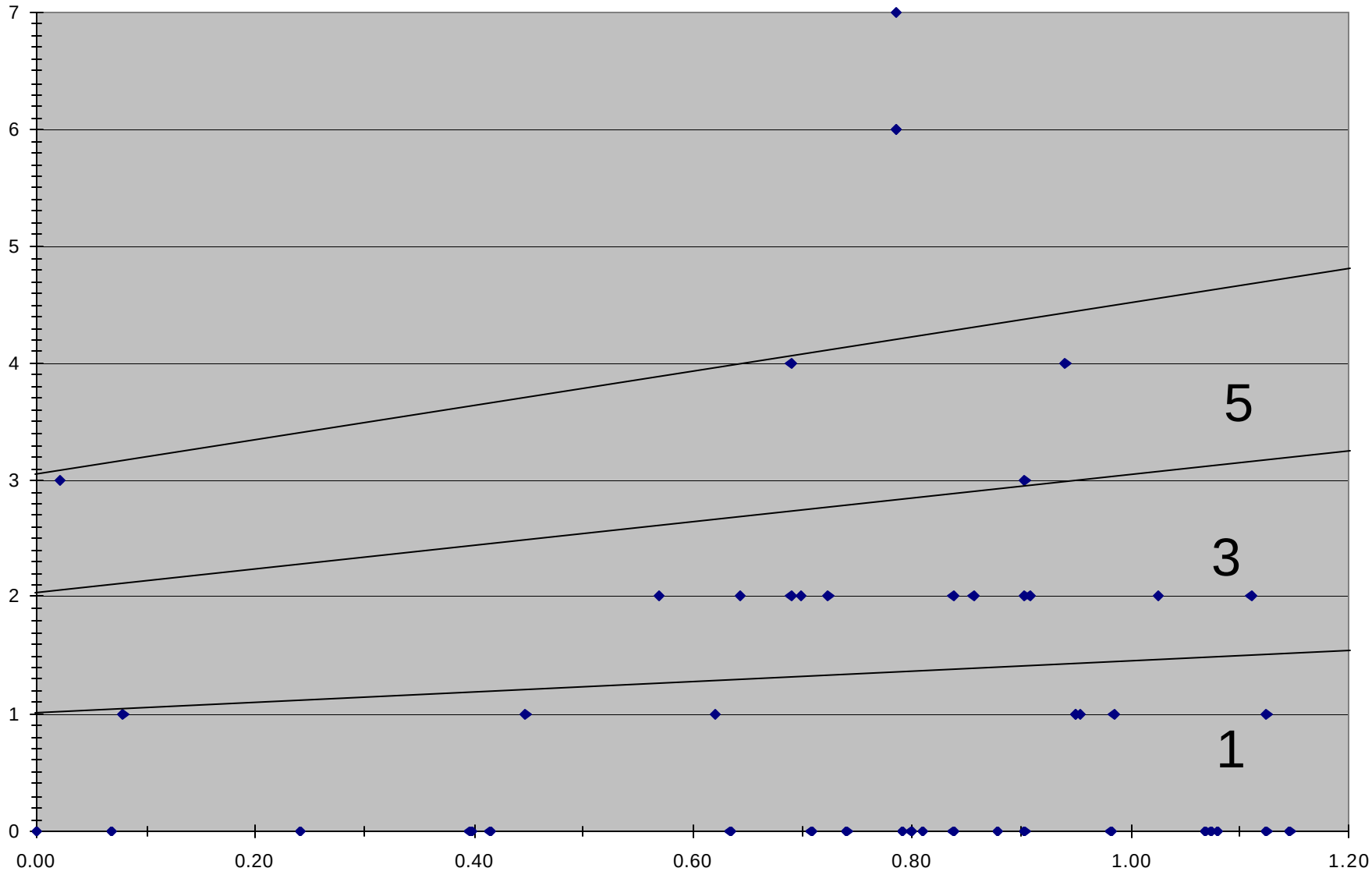
AS3b - SEP. Number of native centrarchid species in the Southeastern Plains ecoregion of the Atlantic Slope drainage basins plotted against the log (base 10) transformed value of the drainage basin area (square miles). Flatlines at 100 square miles. Total samples equal 54.



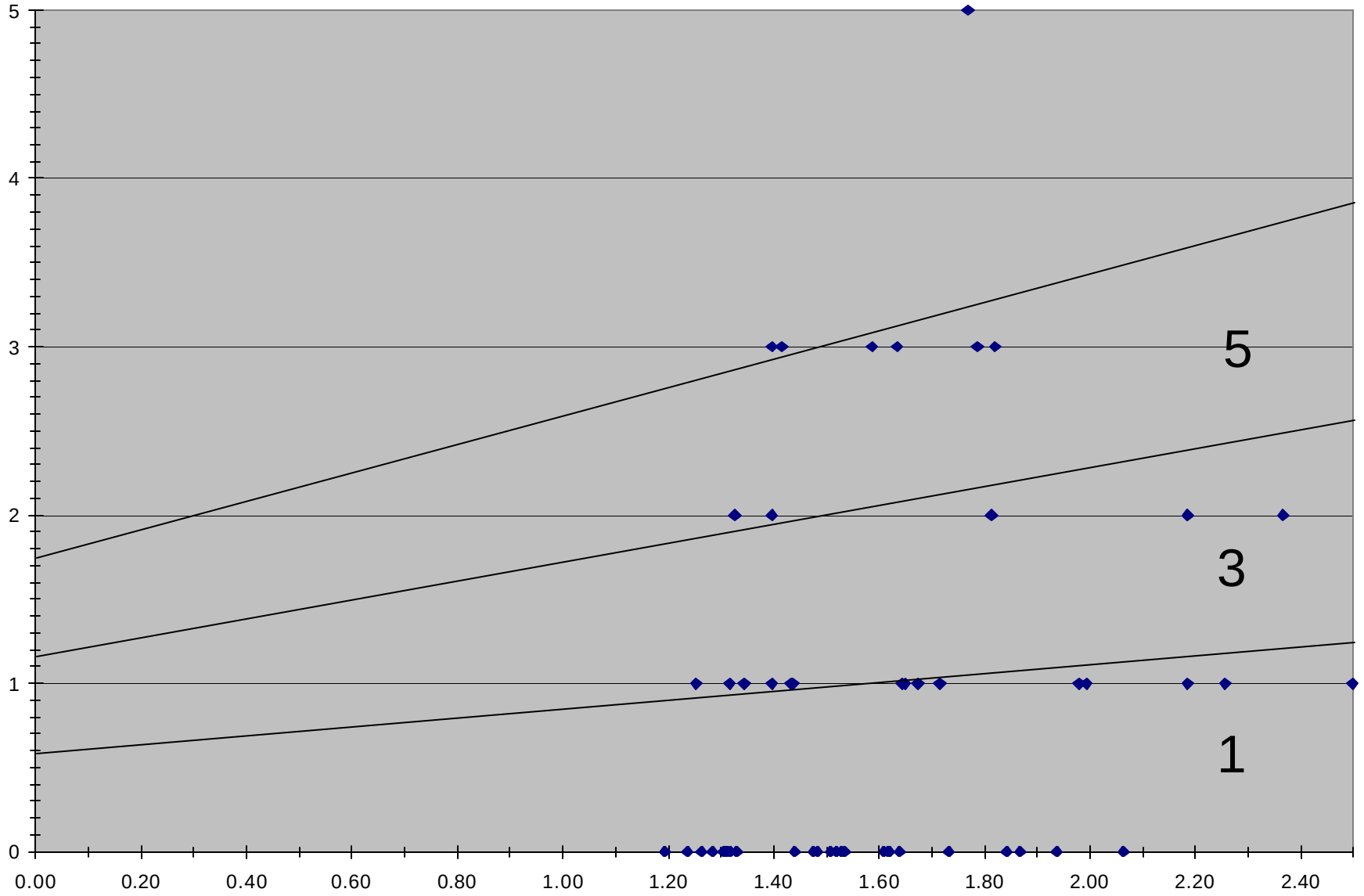
AS4 – SEP. Number of native insectivorous cyprinid species in the Southeastern Plains ecoregion of the Atlantic Slope drainage basins plotted against the log (base 10) transformed value of the drainage basin area (square miles). Flatlines at 100 square miles. Total samples equal 101.



AS5 – SEP. Number of native round-bodied sucker species in the Southeastern Plains ecoregion of the Atlantic Slope drainage basins plotted against the log (base 10) transformed value of the drainage basin area (square miles). Total samples equal 101.



AS6a - SEP. Total number of species ranked as sensitive at headwater sites (<15 square miles drainage basin area) in the Southeastern Plains ecoregion of the Atlantic Slope drainage basins plotted against the log (base 10) transformed value of the drainage basin area (square miles). Total samples equal 47.



AS6b - SEP. Number of species ranked as intolerants in the Southeastern Plains ecoregion of the Atlantic Slope drainage basins plotted against the log (base 10) transformed value of the drainage basin area (square miles). Total samples equal 54.

Fish list for the Apalachicola and Atlantic Slope Drainage Basins in the Southeastern Plains Ecoregion of Georgia. (Updated February 28, 2005)

Species	Tolerance Ranking	Feeding Guild	Species Category	Drainage Basin
Petromyzontidae				
Southern Brook Lamprey *Ichthyomyzon gagei*		HB		CHA, FLI
Lepisosteidae				
Florida Gar *Lepisosteus platyrhincus*		CR		ALT, OCM, OCO
Longnose Gar *Lepisosteus osseus*		CR		CHA, FLI, ALT, OCM, OCO, OGE, SAV
Spotted Gar *Lepisosteus oculatus*		CR		CHA, FLI
Amiidae				
Bowfin *Amia calva*		CR		CHA, FLI, ALT, OCM, OCO, OGE, SAV
Anguillidae				
American Eel *Anguilla rostrata*		CR		CHA, FLI, ALT, OCM, OCO, OGE, SAV
Clupeidae				
Alabama Shad *Alosa alabamae*		IN		CHA, FLI
Skipjack Herring *Alosa chrysochloris*		CR		CHA
American Shad *Alosa sapidissima*		IN		ALT, OCM, OCO, OGE, SAV
Gizzard Shad *Dorosoma cepedianum*		GE		CHA, FLI, ALT, OCM, OCO, OGE, SAV

Fish list for the Apalachicola and Atlantic Slope Drainage Bas ins in the Southeastern Plains Ecoregion of Georgia.

Species	Tolerance Ranking	Feeding Guild	Species Category	Drainage Basin
Threadfin Shad *Dorosoma petenense*		HB		CHA, FLI, ALT**, OCM**, OCO**, SAV**
Cyprinidae				
Bluefin Stoneroller *Campostoma pauciradii*		HB		CHA, FLI
Goldfish *Carassius auratus*		GE		EXOTIC
Grass Carp *Ctenopharyngodon idella*		HB		EXOTIC
Ocmulgee Shiner *Cyprinella callisema*	INT	IC	SMM	OCM, OCO, OGE
Bluestripe Shiner *Cyprinella callitaenia*	INT	IC	SMM	CHA, FLI
Bannerfin Shiner *Cyprinella leedsi*		IC	SMM	ALT, OCM, OCO, OGE, SAV
Whitefin Shiner *Cyprinella nivea*		IC	SMM	SAV
Blacktail Shiner *Cyprinella venusta*		IC		CHA, FLI
Common Carp *Cyprinus carpio*		GE		EXOTIC
Silverjaw Minnow *Ericymba buccata*		IC	SMM	CHA, FLI, OCM

Fish list for the Apalachicola and Atlantic Slope Drainage Basins in the Southeastern Plains Ecoregion of Georgia.

Species	Tolerance Ranking	Feeding Guild	Species Category	Drainage Basin
Eastern Silvery Minnow *Hybognathus regius*	INT	HB		ALT, OCM, OCO, OGE, SAV
Rosyface Chub *Hybopsis rubrifrons*		IC	SMM	OGE, SAV
Coastal Chub *Hybopsis sp. cf. winchelli*	INT	IC	SMM	CHA, FLI
Bandfin Shiner *Luxilus zonistius*		IC		CHA, FLI
Blacktip Shiner *Lythrurus atrapiculus*	INT	IC		CHA, FLI
Bluehead Chub *Nocomis leptocephalus*		GE		CHA, FLI, OCM, OCO, OGE, SAV
Golden Shiner *Notemigonus crysoleucas*		GE		CHA, FLI, ALT, OCM, OCO, OGE, SAV
Ironcolor Shiner *Notropis chalybaeus*	INT	IC		FLI, ALT, OCM, OCO, OGE, SAV
Dusky Shiner *Notropis cummingsae*		IC		CHA, ALT, OCM, OCO, OGE, SAV
Redeye Chub *Notropis harperi*	INT	IC	SMM	CHA, FLI, OCM, OCO
Spottail Shiner *Notropis hudsonius*		IC	SMM	FLI, OCM, OCO
Highscale Shiner *Notropis hypsilepis*		IC	SMM	CHA, FLI

Fish list for the Apalachicola and Atlantic Slope Drainage Basins in the Southeas tern Plains Ecoregion of Georgia.

Species	Tolerance Ranking	Feeding Guild	Species Category	Drainage Basin
Longnose Shiner *Notropis longirostris*		IC	SMM	CHA, FLI
Yellowfin Shiner *Notropis lutipinnis*		IC		FLI, OCM, OCO, OGE, SAV
Tailight Shiner *Notropis maculatus*	INT	IC	SMM	CHA, FLI, ALT, OCM, OCO, OGE, SAV
Coastal Shiner *Notropis petersoni*		IC		CHA, FLI, ALT, OCM, OCO, OGE, SAV
Weed Shiner *Notropis texanus*		IC		CHA, FLI, OCM
Pugnose Minnow *Opsopoeodus emiliae*	INT	IC		CHA, FLI, ALT, OCM, OCO, OGE, SAV
Broadstripe Shiner *Pteronotropis euryzonus*		IC		CHA
Sailfin Shiner *Pteronotropis hypselopterus*		IC		CHA, FLI, ALT, OCM, OCO, OGE, SAV
Bluenose Shiner *Pteronotropis welaka*		IC	SMM	CHA, FLI
Creek Chub *Semotilus atromaculatus*		GE		OGE, SAV
Dixie Chub *Semotilus thoreauianus*		GE		CHA, FLI
Catostomidae				
Quillback *Carpoides cyprinus*		GE		CHA

Fish list for the Apalachicola and Atlantic Slope Drainage Basins in the Southeastern Plains Ecoregion of Georgia.

Species	Tolerance Ranking	Feeding Guild	Species Category	Drainage Basin
Creek Chubsucker *Erimyzon oblongus*		IN	RBS	CHA, FLI, ALT, OCM, OCO, OGE, SAV
Lake Chubsucker *Erimyzon sucetta*	INT	IN	RBS	CHA, FLI, ALT, OCM, OCO, OGE, SAV
Northern Hogsucker *Hypentelium nigricans*		IN	RBS	SAV
Spotted Sucker *Minytrema melanops*		IN	RBS	CHA, FLI, ALT, OCM, OCO, OGE, SAV
V-lip Redhorse *Moxostoma collapsum*	INT	IN	RBS	ALT, OCM, OCO, OGE, SAV
Apalachicola Redhorse *Moxostoma* sp.	INT	IN	RBS	CHA, FLI
Greater Jumprock *Scartomyzon lachneri*	INT	IN	RBS	CHA, FLI
Striped Jumprock *Scartomyzon rupiscartes*		IN	RBS	OCM
Ictaluridae				
Snail Bullhhead *Ameiurus brunneus*		GE		CHA, FLI, ALT, OCM, OCO, OGE, SAV
White Catfish *Ameiurus catus*		GE		CHA, FLI, ALT, OCM, OCO, OGE, SAV
Yellow Bullhead *Ameiurus natalis*		GE		CHA, FLI, ALT, OCM, OCO, OGE, SAV
Brown Bullhead *Ameiurus nebulosus*		GE		CHA, FLI, ALT, OCM, OCO, OGE, SAV

Fish list for the Apalachicola and Atlantic Slope Drainage Basins in the Southeastern Plains Ecoregion of Georgia.

Species	Tolerance Ranking	Feeding Guild	Species Category	Drainage Basin
Flat Bullhead *Ameiurus platycephalus*		GE		ALT, OCM, OCO, OGE, SAV
Spotted Bullhead *Ameiurus serracanthus*		GE		CHA, FLI
Channel Catfish *Ictalurus punctatus*		GE		CHA, FLI, ALT**, OCM**, OCO**, OGE**, SAV**
Tadpole Madtom *Noturus gyrinus*	HWI	IN	BI	CHA, FLI, ALT, OCM, OCO, OGE, SAV
Margined Madtom *Noturus insignis*	INT	IN	BI	SAV
Speckled Madtom *Noturus leptacanthus*	HWI	IN	BI	CHA, FLI, ALT, OCM, OCO, OGE, SAV
Flathead Catfish *Pylodictis olivaris*		CR		FLI**, ALT**, OCM**, OCO**, OGE**, SAV**
Esocidae				
Redfin Pickerel *Esox americanus*		CR		CHA, FLI, ALT, OCM, OCO, OGE, SAV
Chain Pickerel *Esox niger*		CR		CHA, FLI, ALT, OCM, OCO, OGE, SAV
Umbridae				
Eastern Mudminnow *Umbra pygmaea*		IN		ALT, OGE, SAV
Aphredoderidae				
Pirate Perch *Aphredoderus sayanus*		IN		CHA, FLI, ALT, OCM, OCO, OGE, SAV

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Species	Tolerance Ranking	Feeding Guild	Species Category	Drainage Basin
Amblyopsidae				
Swampfish *Clologaster cornuta*		IN		ALT, OCM, OCO, OGE, SAV
Fundulidae				
Banded Topminnow *Fundulus auroguttatus*		IN		CHA, FLI
Golden Topminnow *Fundulus chrysotus*		IN		CHA, FLI
Russetfin Topminnow *Fundulus escambiae*		IN		CHA, FLI
Lined Topminnow *Fundulus lineolatus*		GE		ALT, OCM, OCO, OGE, SAV
Blackspotted Topminnow *Fundulus olivaceus*		IN		CHA
Pygmy Killifish *Leptolucania ommata*		IN		CHA, FLI, ALT
Bluefin Killifish *Lucania goodie*		HB		FLI
Poeciliidae				
Mosquitofish *Gambusia* sp.		GE		CHA, FLI, ALT, OCM, OCO, OGE, SAV
Least Killifish *Heterandria formosa*		IN		CHA, FLI

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Antheridae				
Brook Silversides *Labidesthes sicculus*		IN		CHA, FLI, ALT, OCM, OCO, OGE, SAV
Percichthyidae				
White Bass *Morone chrysops*		CR		CHA**, FLI**, SAV**
Striped Bass *Morone saxatalis*		CR		CHA, FLI, ALT, OCM, OCO, OGE, SAV
Elassomatidae				
Banded Pygmy Sunfish *Elassoma zonatum*		IN		CHA, FLI, ALT, OCM, OCO, OGE, SAV
Everglades Pygmy Sunfish *Elassoma evergladei*		IN		ALT, OCM, OCO, OGE, SAV
Okefenokee Pygmy Sunfish *Elassoma okefenokee*		IN		ALT, OCM, OCO
Centrarchidae				
Mud Sunfish *Acantharchus pomotis*		IN	SF	ALT, OCM, OCO, OGE, SAV
Shadow Bass *Ambloplites ariommus*	INT	CR	SF	CHA, FLI
Flier *Centrarchus macropterus*		IN	SF	CHA, FLI, ALT, OCM, OCO, OGE, SAV
Blackbanded Sunfish *Enneacanthus chaetodon*		IN	SF	FLI
Bluespotted Sunfish *Enneacanthus gloriosus*		IN	SF	FLI, ALT, OCM, OCO**,** OGE, SAV

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Species	Tolerance Ranking	Feeding Guild	Species Category	Drainage Basin
Banded Sunfish *Enneacanthus obesus*		IN	SF	ALT, OCM, OCO, OGE, SAV
Redbreast Sunfish *Lepomis auritus*		IN	SF	CHA, FLI, ALT, OCM, OCO, OGE, SAV
Green Sunfish *Lepomis cyanellus*		IN		CHA**, FLI**, ALT**, OCM**, OCO**, OGE**, SAV**
Warmouth *Lepomis gulosus*		CR	SF	CHA, FLI, ALT, OCM, OCO, OGE, SAV
Bluegill *Lepomis macrochirus*		IN	SF	CHA, FLI, ALT, OCM, OCO, OGE, SAV
Dollar Sunfish *Lepomis marginatus*		IN	SF	CHA, FLI, ALT, OCM, OCO, OGE, SAV
Longear Sunfish *Lepomis megalotis*		IN		CHA**, FLI**, OCM**, OCO**
Redear Sunfish *Lepomis microlophus*		IN	SF	CHA, FLI, ALT, OCM, OCO, OGE, SAV
Spotted Sunfish *Lepomis punctatus*		IN	SF	CHA, FLI, ALT, OCM, OCO,
Shoal Bass *Micropterus cataractae*	INT	CR	CENT	CHA, FLI
Spotted Bass *Micropterus punctulatus*		CR		CHA**, FLI**
Largemouth Bass *Micropterus salmoides*		CR	CENT	CHA, FLI, ALT, OCM, OCO, OGE, SAV

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Species	Tolerance Ranking	Feeding Guild	Species Category	Drainage Basin
White Crappie *Pomoxis annularis*		CR		CHA**, FLI**
Black Crappie *Pomoxis nigromaculatus*		CR	CENT	CHA, FLI, ALT, OCM, OCO, OGE, SAV
Percidae				
Brown Darter *Etheostoma edwini*		IN	BI	CHA, FLI
Savannah Darter *Etheostoma fricksium*		IN	BI	SAV
Swamp Darter *Etheostoma fusiforme*		IN	BI	CHA, FLI, ALT, OCM, OCO, OGE, SAV
Christmas Darter *Etheostoma hopkinsi*	HWI	IN	BI	ALT, OCM, OCO, OGE, SAV
Tessellated Darter *Etheostoma olmstedi*	INT	IN	BI	ALT, OCM, OCO, OGE, SAV
Goldstripe Darter *Etheostoma parvipinne*		IN	BI	CHA, FLI, OCM
Sawcheek Darter *Etheostoma serrifer*		IN	BI	ALT, OCM, OCO, OGE, SAV
Gulf Darter *Etheostoma swaini*	INT	IN	BI	CHA, FLI
Blackbanded Darter *Percina nigrofasciata*		IN	BI	CHA, FLI, ALT, OCM, OCO, OGE, SAV
Yellow Perch *Perca flavescens*		CR		EXOTIC

Water Quality Tolerance: **HWI** = headwater intolerant; **INT** = intolerant
Feeding Guild: **CR** = top carnivore; **GE** = generalist; **HB** = herbivore; **IC** = insectivorous cyprinid; **IN** = insectivore/invertivore
Species Category: **BI** = benthic insectivore species; **CENT** = centrarchid species; **RBS** = round-bodied sucker species; **SF** = sunfish species; **SMM** = subterminal mouth minnow species
Drainage Basin: **ALT** = Altamaha; **CHA** = Chattahoochee; **FLI** = Flint; **OCM** = Ocmulgee; **OCO** = Oconee; **OGE** = Ogeechee; **SAV** = Savannah
EXOTIC = introduced to Georgia
****** = species introduced to that drainage basin