

**17-20 November 2007**  
**Incidental Take Monitoring**  
**Methodology and Results**

**Sample Site Selection Protocol**

On 16 November 2007, the U.S. Fish and Wildlife Service (USFWS) provided the USACE Mobile District data describing observations of federally listed mussels in the action area (1990-present) that included approximately 370 records. Records included multiple transect-base observations within sites visited on a single date as well as multiple visits to a site on different dates. We used these data to estimate both the number of sites for each species (including observations of more than one listed species at a site) and the number of mussels exposed by implementing an incremental flow reduction in the Apalachicola River. Specific methods used to obtain these estimates follow.

GIS Map Analysis: We utilized the ARCMAP software to map the individual records along the Apalachicola River. The USFWS provided shape layers for the records of each species. We analyzed these shape layers to identify grouped records that appeared to define individual sites. For our purposes, a site included one or more individual records clustered in a limited river reach (typically 200-250 m or less). A polygon was drawn around each record or set of records to represent each such site and then all sites were counted. This process was repeated for each of the three species and resulted in 100 fat threeridge sites, 28 purple bankclimber sites, and 4 Chipola slabshell sites within the action area.

It should be noted that several of the fat threeridge sites also included purple bankclimber or Chipola slabshell observations. Such sites also were included among monitoring sites picked for those species. However, for the purposes of counting known sites for each species, this overlap was ignored.

Fat Threeridge: Fat threeridge have been collected at sites (100) throughout much of the entire Apalachicola River. However, a disproportionate fraction of the population inhabits the middle reaches (e.g., RM 40-50). For this reason, a stratified random sampling design was used to select survey sites. Based on discussions with USFWS and the Corps Engineering Research Development Center (ERDC), it was determined that a minimum of 15% of the fat threeridge sites should be monitored in order to provide a representative sample. Furthermore, because the largest fraction of the fat threeridge sites occur in the RM40-50 reach, it was determined that at least 40% of this effort would be allocated to the RM 40-50 reach; the remaining sites were split between river reaches above RM50 and below RM40.

In order to provide a more robust data set for estimating take, we selected for monitoring a total of 33 unique fat threeridge sites (33% of the 100 identified). Using a random number generator in Microsoft Excel software, we first selected 16 sites between RM 40 and 50 so that half of the sampled sites would fall in this important reach. Then, the same

process was used to randomly select eight sites from the reach above RM50 followed by selection of nine sites from the reach below RM40. Thus, eight sites were selected at random to represent the upper reach, 16 at random to represent the middle reach, and nine at random to represent the lower reach. This resulted in a total of 33 fat threeridge sites selected for monitoring.

It should be noted that several of these sites also included purple bankclimber and Chipola slabshell observations. Such sites also were included among monitoring sites selected for those species.

Purple Bankclimber: We determined that sampling approximately 50% of the known purple bankclimber sites would provide a representative sample. Twenty eight unique purple bankclimber sites were identified within the action area, and, as just alluded to, five of these happened to be selected by the random process used to guide sampling of fat threeridge. An additional 11 sites were selected from the remaining 23 bankclimber sites using the random number generator. Thus, a total of 16 purple bankclimber sites (57% of the 28 possible sites) were selected for monitoring.

Chipola Slabshell: Four Chipola slabshell sites were identified within the action area using the mapping process described above. One of these sites was a site that happened to fall into those randomly selected in the process described for the fat threeridge monitoring. This one site plus the remaining three sites were selected for Chipola slabshell monitoring. Thus, 100% of sites with this species were monitored.

### **Mussel Survey Protocol**

Once we identified the appropriate number of mussel sites to monitor, we implemented a standard survey protocol at each of the sites. This consisted of a Catch Per Unit Effort (CPUE) technique where exposed mussels were counted along a standard length of shoreline at each randomly selected site. This approach was based on discussions with USFWS and ERDC that determined a minimal length of shore (and area of recently exposed river bottom) was most appropriate for estimating the numbers of mussels exposed by the various incremental flow reductions. A standard sample length of 150 ft was used at each site. At sites where 150 ft of habitat was not available, the entire habitat length was searched. At one site, a length of 160 ft was searched due to site topography.

The width of the search area varied among sites depending on bank slope and topography (i.e., steeper slope resulted in a smaller band of exposure due to the incremental reduction of discharge). At a larger spatial scale, the reduction from 5,000 to 4,750 cfs flow affected the change in water surface elevation differently in the upper, middle, and lower reaches. In the narrower upper reach near the Chattahoochee, Florida gage (approximately RM 105.7), an approximate 3-inch drop in water surface elevation was observed. In the wider river reaches downstream, a smaller drop in stage was observed; this drop was approximately 1.5 inch near Blountstown gage (approximate RM 77.4), and 1 inch near Wewahitchka gage (approximate RM 41.7). Overall, the width of the surveyed dewatered area at any sampled site tended to fall within 1-3 ft.

A GPS unit was used to mark the upstream and downstream limits of each sampled survey area and a measuring tape was used to measure the width of the area exposed by the reduction in flow to 4750 (wetted area just prior to the reduction in flow). At all sites algae and trash lines provided field measures that clearly marked the previous shoreline and the width was measured from this demarcation to the current wetted shoreline. The entire survey area was searched for exposed listed mussel species and the number and condition (live, fresh dead, predation) of the observed listed mussels was recorded. Notes were also taken regarding the presence of other native and non-native mussel species in the survey area and observations of mussels in the inundated habitat immediately offshore of or adjacent to the survey area, although these mussels were not included in the estimate of incidental take.

If GIS coordinates for a previously recorded site placed a sample location in unsuitable habitat (high sandbar or disposal area) or in deep water near the thalweg, a replacement sample location with suitable habitat was selected in the immediate vicinity. If no suitable replacement habitat could be identified in the immediate vicinity, then the sample site was discarded.

### **Actual Sites Surveyed**

Fat Threeridge: Two of the fat threeridge sites selected for monitoring were eliminated. One of these sites was located in deep water near the thalweg and suitable mussel habitat was not observed along the nearby shoreline. The other site was inadvertently eliminated due to a mapping error. Neither of the eliminated sites was known to support listed species other than fat threeridge. A total of 31 sites known to support fat threeridge mussels were therefore surveyed. Of the 31 sites, 13 (42%) were located between Apalachicola River RM40-50, including one in the Chipola River. Eight (26%) of the fat threeridge sites sampled occurred above RM50, and Nine (29%) of the sites sampled occurred below RM40, including 1 site in the Chipola River near the confluence with the Apalachicola River and 1 site in a distributary of the Apalachicola River near RM26. The 31 sites surveyed for fat threeridge represent 31% of the sites with recorded fat threeridge observations.

Purple Bankclimber: Several of the purple bankclimber sites, as determined by previous dive surveys, were located in deep water near the thalweg. At these locations, suitable mussel habitat along the shoreline adjacent to or near the known site was selected for the survey. Two of the purple bankclimber sites selected for monitoring were eliminated due to lack of suitable mussel habitat at or near the known site. One of these sites was located in a dry channel behind an island in the river. The channel has been dry all summer and no longer provides suitable mussel habitat. The other site eliminated was located in deep water near the thalweg and suitable mussel habitat was not observed along the nearby shoreline. In addition, one of the purple bankclimber sites identified for monitoring included the rock shoal area near RM105. Due to the large extent of this area, two sample sites were selected along the rock shoal habitat. A total of 14 sites known to

support purple bankclimber mussels were surveyed. This represents 50% of the sites with recorded purple bankclimber observations.

Chipola Slabshell: All of the sites known to support Chipola slabshell were surveyed, for a total of 4 sites.

## **Results**

Fat Threeridge: Fat threeridge mussels were observed at eight of the 44 sites surveyed. Seven of these sites were from the 31 randomly selected fat threeridge monitoring sites and 14 fat threeridge mussels were observed in the exposed habitat area at these seven sites. One of these sites was a Chipola slabshell site that was not previously recorded to support fat threeridge mussels and two fat threeridge were observed in the exposed sample area at this location.

The USFWS assisted in the monitoring effort and noted that although the random sampling technique was appropriate for estimating take at most of the fat threeridge sites in the action area, it likely resulted in an underestimation of fat threeridge take since none of the randomly selected sites included high density “vulnerable” habitat that USFWS observed during their quantitative surveys conducted in October 2007. Only one of the randomly selected sites for monitoring represented a “vulnerable” site. However, this “vulnerable” site appears to be a low density site. Therefore, USFWS evaluated an additional “vulnerable” site on 27 November 2007. This “vulnerable” site is a high density site. A detailed description of the take estimation for the vulnerable sites is provided in the Fat Threeridge Take Estimation section below.

Purple Bankclimber: No purple bankclimber were observed in the exposed habitat areas surveyed during the monitoring effort. Therefore, we estimate that no purple bankclimber take resulted from the reduction in flow.

Chipola Slabshell: No Chipola slabshell were observed in the exposed habitat areas surveyed during the monitoring effort. Therefore, we estimate that no Chipola slabshell take resulted from the reduction in flow.

## **Fat Threeridge Take Estimation**

We originally intended to use the results of the 31 randomly selected fat threeridge monitoring sites to estimate take. However, this fails to include fat threeridge take observed at sites selected for the other two species. No fat threeridge take was observed at sites selected only for purple bankclimber monitoring, but fat threeridge take (two individuals) was observed at a site selected for Chipola slabshell monitoring. The results of the survey effort and resultant discussions with the UFWS indicated that additional interpretation was needed to develop a more accurate estimate of take. As described above, the sites randomly selected for fat threeridge monitoring are appropriate for estimating take at most of the fat threeridge sites in the action area. However, the USFWS has identified six “vulnerable” habitat sites for fat threeridge within RM40-50

that may not have been captured using the random sampling technique. “Vulnerable” habitat is characterized by moderately depositional areas that are transitioning into highly depositional areas as part of the lateral and downstream migration of the river channel. This natural phenomenon results in the creation and eventual destruction of high quality mussel habitat and is generally limited to the highly active middle reaches of the river. These site features result in relatively broad areas of habitat with very shallow slope, and can be exposed by relatively small drops in stage. Based on discussions with USFWS it was determined that additional take estimation was needed to capture the amount of take in these “vulnerable” habitats since take in these areas could be an order of magnitude greater than the take estimated in the “nonvulnerable” river channel shoreline habitat areas. Therefore, the fat threeridge take estimation includes a composite of three separate take estimations within the action area: 1) the “nonvulnerable” fat threeridge sites sampled along the river channel shoreline; 2) the Chipola slabshell sites; and 3) the “vulnerable” fat threeridge sites located in hooks and bays and similar depositional areas. The results and methodology for each of these analyses is provided below. The attached spreadsheets provide the calculations for take.

- 1) “Nonvulnerable” Fat Threeridge Sites. Data from 30 of the 31 randomly selected fat threeridge monitoring sites was used for this take estimate. The data from the remaining site was included in the “vulnerable” habitat take estimation since this was one of the six “vulnerable” habitat sites identified. Each of the sites was surveyed as described above and fat threeridge observed in the exposed area were counted. The data was then sub-divided into the 10-mile river reaches described in Table 3.5.2.2.B of the Amended Biological Opinion and Conference Report. An average exposed habitat area width was calculated for the sites within each 10-mile reach and this value was multiplied by the summed length of the survey areas within each reach to calculate the amount of exposed area surveyed. The amount of available habitat exposed within each of the 10-mile river reaches was calculated from the data provided in Table 3.5.2.2.B by multiplying the number of sites with habitat by the average length of each site (433 ft) and by the average width of exposed habitat. The value for the average length of each site was provided by the USFWS based on the quantitative habitat and mussel sampling they conducted at 11 sites in the RM40-50 reach (October 2007), and is consistent with the value they used for determining the total habitat available within each 10-mile reach for Table 3.5.2.2.B. The estimated take for each 10-mile river reach is calculated by multiplying the number of fat threeridge mussels observed in the exposed habitat by the ratio of the exposed area within the available habitat to the exposed area within the surveyed habitat. An estimated take of 108 fat threeridge mussels in “nonvulnerable” habitat was calculated by adding the estimated take of each of the 10-mile river reaches.
- 2) Chipola Slabshell Sites. Data from the four known Chipola slabshell sites was used for this take estimate. One of these sites was also a randomly selected fat threeridge site, but no fat threeridge take was observed at this site. No take was observed at two of the Chipola slabshell sites and two fat threeridge mussels were observed within the exposed habitat of the survey area at the remaining Chipola

slabshell site. The fat threeridge estimated take for the Chipola slabshell sites was calculated using the same technique described above for the “nonvulnerable” habitat sites. Consistent with Table 3.5.2.2.B, the number of sites with habitat and the 433-ft average length was used to calculate the amount of available exposed habitat by multiplying the average width of exposed habitat at the four sampled sites. The estimated take for fat threeridge mussels in the Chipola River and Chipola Cut is 62.

- 3) “Vulnerable” Fat Threeridge Sites. The USFWS has identified six sites considered “vulnerable” due to river channel migration. Some of these sites contain relatively high densities of fat threeridge that could suffer a disproportionate amount of take with reductions in river flow due to the unique backwater habitat features that characterize these sites. In order to integrate potential take in these specific habitats into the overall estimate, additional sampling and analysis was conducted. One of the “vulnerable” habitat sites was randomly selected for fat threeridge monitoring and data was collected at this site according to the methods described above. This site represents a “vulnerable” site that is in the later stages of transition into highly depositional or terrestrial habitat and appears to have a relatively low density of fat threeridge as compared to the other sites. At this site, one fat threeridge mussel was observed in the surveyed exposed habitat area (150 ft long by 1 ft wide) resulting in a density of 0.007 individuals per ft<sup>2</sup>. The USFWS quantitatively sampled one of the other “vulnerable” habitat sites in October 2007. Data from this survey as well as exposed habitat area data collected on 27 November 2007 were used to estimate density within the exposed habitat area and total take estimate for the exposed habitat within the “vulnerable” sites. Details regarding the sampling methodology at this site are provided in the Amended Biological Opinion and Conference Report. The USFWS calculated the exposed habitat area within the site by using a GPS unit to map a polygon as they walked along the boundaries of the exposed area. This method resulted in an exposed habitat area of approximately 3,002 ft<sup>2</sup>. The density estimate for the exposed habitat area was based on the results of two of the four transects that the UFWS systematically sampled at this site in October. These two transects crossed the exposed habitat area and the number of live mussels observed within the quadrats along these two transects (within the exposed habitat area) was used to calculate a density of 0.245 individuals per ft<sup>2</sup> in the exposed habitat area.

Since the USFWS site appeared to represent the highest density “vulnerable” site (based on USFWS observations) and the randomly selected fat threeridge monitoring site appeared to represent the lowest density “vulnerable” site, these densities were averaged together to calculate an average density of fat threeridge within the exposed habitat at the six “vulnerable” sites. Similarly, the amount of exposed habitat at these two sites appeared to represent the upper and lower ranges of exposure (based on USFWS observations). Therefore, the average amount of exposed habitat at the six “vulnerable” sites was calculated from the two sites resulting in a value of approximately 1,717 ft<sup>2</sup>. The estimated fat

three-ridge take within the exposed habitat at the six “vulnerable” sites was calculated by multiplying the average density by the average amount of exposed habitat by six. Results indicate an estimated take of 1,299 individual fat three-ridge mussels at the “vulnerable” habitat sites.

The estimated take for fat three-ridge mussels in the action area is calculated by summing the three separate take estimates and results in an estimated take of 1,469 individual fat three-ridge mussels. The Incidental Take Statement contained within the Amended Biological Opinion and Conference Report permits the take of up to 5,600 fat three-ridge mussels within the action area for the incremental flow reduction to 4,750 cfs.

### **Future Incidental Take Monitoring Efforts**

Based on “lessons learned” from the first incidental take monitoring effort, incidental take monitoring associated with the next incremental reduction in flow to 4,500 cfs will likely be modified. Specific changes will likely include additional sampling at the “vulnerable” habitat sites and modifications to the purple bankclimber monitoring site selections and methodology. Since only four known Chipola slabshell sites occur within the action area, all these sites will be monitored again. However, future efforts may include measuring the upstream and downstream boundaries of each site in order to refine the exposed area estimate and potentially surveying the entire site rather than a 150-foot representative portion of the site. Potential changes to the fat three-ridge and purple bankclimber monitoring methodology are described below.

Fat Three-ridge: The USFWS is currently continuing the fat three-ridge habitat mapping effort along the main stem of the Apalachicola River by visiting previously identified potential habitat sites and measuring the lateral length of each site as well as classifying the site as “vulnerable” or “nonvulnerable”. Additionally, brief timed searches are being conducted at each site in order to document fat three-ridge presence and develop an estimate of density at each site. Assuming this information is available prior to the next incremental reduction in flow; it will be used along with the previously provided fat three-ridge site data in the selection of fat three-ridge monitoring sites. In addition, since habitat conditions have changed considerably in portions of the river over the last 25 years (USFWS provided data included observations between 1990 – present) it was mutually agreed that fat three-ridge data from observations prior to 2002 should be eliminated from the pool of potential monitoring sites. Elimination of this data allows us to focus our efforts on the most current (and probably most reliable) fat three-ridge habitat locations in order to measure the impact of the reduction in flow. A representative subset of the known “nonvulnerable” fat three-ridge sites would still be randomly selected to estimate incidental take. However, the new data regarding the size of each site would allow us to further refine the estimate of the amount of habitat exposed at each site and within the action area which would in turn result in a more accurate estimate of the incidental take occurring at the “nonvulnerable” sites. Future efforts would also likely include monitoring of all the sites classified as “vulnerable”. It is undetermined if the size of the survey area at these sites will be standardized to a 150 ft length or if the entire exposed habitat area will be surveyed. The incidental take estimate for fat three-ridge will

likely still include a combination of take estimates for the “nonvulnerable” sites, Chipola slabshell sites, and “vulnerable” sites. We will continue to work closely with the USFWS regarding a revised sampling methodology for fat threeridge incidental take.

Purple Bankclimber: During the initial purple bankclimber incidental take monitoring effort we realized that we lack sufficient information regarding the characterization of and amount of purple bankclimber habitat in the action area to apply a stratified random sampling technique for estimating incidental take. Since no purple bankclimber take was observed at the 14 previously identified purple bankclimber sites monitored (approximately 50% of the known sites) it was determined that this was not a significant issue for the first incremental flow reduction. However, since observations suggest that the next incremental flow reduction will likely result in incidental take of purple bankclimber, we have determined that a more comprehensive incidental take monitoring protocol should be implemented. This protocol will likely include a more detailed review of the known purple bankclimber location data that considers the date of the observation, the details of how many purple bankclimber were detected, and the relevant micro-habitat data (depth, substrate, survey technique). Based on this analysis, a new set of purple bankclimber incidental take monitoring locations could be selected that focuses on habitat areas likely to be impacted by the next incremental flow reduction (4,500 cfs). Since we lack sufficient information to apply a random sampling of a subset of these locations, all of these locations should be sampled. The sampling methodology at these sites would likely consist of delineating the extent of suitable habitat exposed by the incremental flow reduction and an assessment of the amount of take occurring within the entirety of this area. We will continue to work closely with the USFWS regarding the revised sampling methodology for purple bankclimber incidental take.



**Mussel Incidental Take Monitoring Site Coordinates**

FID No.	NM	Site Location hddd.ddddd°		Upstream Boundary hddd.ddddd°		Downstream Boundary hddd.ddddd°		Comment
		Lat	Long	Lat	Long	Lat	Long	

UPPER RIVER REACH (NM 50.1 - 106.6):

346		30.696270000	-84.857990000					
346B	105.5							NA
346A	105.4							NA
303		30.686709940	-84.863939970					discarded
312		30.670889930	-84.876979940					
*312A	103.3							NA
345	103.2	30.669239960	-84.877609930	30.669331570	-84.877369620	30.669089250	-84.877834650	
318		30.665909990	-84.884859940					
*318A	102.6			30.665517550	-84.884425420	30.665281180	-84.884863880	
317		30.638559930	-84.902829980					
*317A	100.3			30.638672660	-84.902534190	30.639828440	-84.901618550	
305	100.2	30.636089950	-84.903949970	30.636274600	-84.903136340	30.635890210	-84.903259560	
344	99.0	30.619849930	-84.908959920	30.619990160	-84.908769820	30.619725200	-84.909089670	
308	92.3	30.563369980	-84.962599990	30.563248020	-84.962130610	30.562938140	-84.962380470	
294	87.0	30.495739920	-84.995019940	30.496050810	-84.994647360	30.495814690	-84.994888850	
307		30.482539940	-84.998740000					discarded
293	85.6	30.479619930	-85.004099970	30.479814140	-85.003880870	30.479542990	-85.004215720	
288	72.6	30.388369920	-85.015509920	30.388629340	-85.015507150	30.388310500	-85.015572950	
310	71.5	30.375409990	-85.026339930	30.375155850	-85.026622820	30.375155690	-85.026604790	
285	64.0	30.315349970	-85.034209950	30.315389360	-85.034121600	30.315275870	-85.033933680	
17	59.8	30.285600000	-85.059009990	30.286007020	-85.058752070	30.285988750	-85.059200000	
139	55.5	30.243999940	-85.078269920	30.243848730	-85.078264560	30.243406330	-85.078271680	
31	54.2	30.232049940	-85.079659980	30.232217250	-85.079983350	30.232025300	-85.079574400	
24		30.221499980	-85.091700000					
*24A	52.8			30.220129370	-85.095017130	30.220260550	-85.095460700	

MIDDLE RIVER REACH (NM 40-50):

224	49.9	30.209079920	-85.114089990	30.209825580	-85.114956260	30.210161610	-85.115258590	
231	49.0	30.204569960	-85.116449990	30.204748490	-85.116698430	30.204501310	-85.116308090	
261	48.0	30.195599980	-85.121409990	30.196003570	-85.120794000	30.195831400	-85.121215690	
260	47.6	30.188846000	-85.123738000					discarded
12	47.5	30.186529920	-85.125539920	30.186939710	-85.125900930	30.186495890	-85.125879640	
254	44.8	30.156949940	-85.134559930	30.157179680	-85.134277300	30.156983130	-85.134531690	
109	44.2	30.153020000	-85.134289950	30.153202300	-85.134254250	30.152984460	-85.134262960	

253	43.8	30.150130000	-85.136879960	30.150927870	-85.136333460	30.150575670	-85.136538320	
57		30.149080000	-85.135639940					discarded
227	43.6	30.147299930	-85.139629980	30.146999780	-85.139546580	30.146684450	-85.139704330	
243	42.9	30.142109940	-85.129789960	30.142604560	-85.130044600	30.142248160	-85.129843350	
241	42.7	30.140139940	-85.136279990	30.140169450	-85.136373110	30.140058890	-85.136830590	
249	40.8	30.121009930	-85.138249980	30.121173960	-85.139436610	30.121214950	-85.138976280	
247	40.4	30.121359960	-85.131189990	30.121414860	-85.131568690	30.121435980	-85.131073990	
135	40.4	30.120649920	-85.129839920	30.121094840	-85.130012920	30.120853350	-85.129642610	

LOWER RIVER REACH (NM 0-39.9)

21	35.3	30.085899980	-85.136800000	30.086104250	-85.136959590	30.085718340	-85.136807540	
277	34.5	30.078009930	-85.135459980	30.078144870	-85.135350010	30.077813540	-85.135656870	
28	33.5	30.067679980	-85.132589940	30.067906380	-85.133065690	30.067832950	-85.132601420	
14	30.6	30.030509930	-85.122469960	30.030462830	-85.122653270	30.030330310	-85.122404670	
270		30.016179980	-85.094989980					
*270A	28.4			30.015482600	-85.096228740	30.015709000	-85.095840320	
197		30.008769960	-85.064889970					
*197A	Kennedy Creek			30.006340000	-85.065490000	30.006100000	-85.065560000	
268	25.9	30.004379940	-85.061719940	30.004410530	-85.061719770	30.004391920	-85.061157930	
10	21.8	29.966419970	-85.024089970	29.965980010	-85.023299220	29.965578260	-85.023375670	

CHIPOLA RIVER:

360		30.124499980	-85.177499920	30.124413900	-85.177290540	30.123995390	-85.177241840	
38		30.098979940	-85.181669920	30.098897880	-85.181573020	30.098490940	-85.181670590	
296		30.103809930	-85.172759960	30.103929960	-85.172851990	30.103722170	-85.173118370	
3		30.011549980	-85.092439950	30.010950760	-85.093097010	30.010936600	-85.092594680	

CHIPOLA CUTOFF:

298		30.123869920	-85.176479930	30.123913670	-85.176145410	30.123509750	-85.176125290	
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NOTE: \* Denote sites that were adjusted from the original record due to habitat changes.  
The shaded sites are ones that lack coordinate data due to GPS error.



Apalachicola Mussels Incidental Take Monitoring - 17-20 November 2007 - Purple Bankclimber Data

FID No.	NM	Length	Width	Area	# PB	DATE	MUSSEL SP. KNOWN TO OCCUR AT SITE
UPPER RIVER REACH (NM 50.1 - 106.6):							
346B	105.5	150	0.87	130.5	0		PB
346A	105.4	160	4.25	680	0		PB
312A	103.3	150	3.00	450	0		PB
345	103.2	150	3.00	450	0		PB
318A	102.6	150	2.75	412.5	0		PB
317A	100.3	150	4.00	600	0		PB
305	100.2	150	3.00	450	0		PB
344	99.0	150	1.50	225	0		PB
308	92.3	150	0.20	30	0		PB
310	71.5	150	3.00	450	0		PB
17	59.8	150	2.80	420	0		FT, PB
24A	52.8	150	3.00	450	0		FT, PB
MIDDLE RIVER REACH (NM 40-50):							
109	44.2	150	3.00	450	0		FT, PB
LOWER RIVER REACH (NM 0-39.9)							
268	25.9	150	2.00	300	0		FT, PB
10	21.8	150	1.00	150	0		FT, PB
CHIPOLA RIVER:							
CHIPOLA CUTOFF:							

Apalachicola Mussels Incidental Take Monitoring - 17-20 November 2007 - Chipola Slabshell Data

FID No.	NM	Length	Width	Area	# CS	DATE	MUSSEL SP. KNOWN TO OCCUR AT SITE		
UPPER RIVER REACH (NM 50.1 - 106.6):									
MIDDLE RIVER REACH (NM 40-50):									
LOWER RIVER REACH (NM 0-39.9)									
CHIPOLA RIVER:									
360		150	2.50	375	0		CS		
38		150	2.00	300	0		CS		
296		150	2.00	300	0		FT, CS		
CHIPOLA CUTOFF:									
298		146	1.00	146	0		CS		

### Fat Threeridge Take Estimate Based on Data From the Four Known Chipola Slabshell Sites

RM Range	# sites with habitat	Avg Length Available Habitat per Site (ft)	Avg Width Exposed Habitat Surveyed (ft)	Summed Length Surveyed Area (ft)	Exposed Area Surveyed Habitat (ft2)	# Fat threeridge Take	Summed Length Available Habitat (ft)	Exposed Area Available Habitat (ft2)	Ratio Exposed Area Available Habitat to Exposed Area Surveyed Habitat	Incidental Take Estimate
Chipola River/Chipola Cut	43	433	1.88	596.00	1117.50	2	18619	34910.63	31.23993	62
									<b>Total</b>	<b>62</b>

NOTE: This calculation considers only information from the four known Chipola Slabshell sites. The two exposed fat threeridge observed occurred at a site not previously known to support fat threeridge and the site was selected based on the presence of Chipola Slabshell. These individuals were not included in the fat threeridge estimate calculated from data collected at the 30 randomly selected sites for fat threeridge. One of the known Chipola slabshell sites was also known to support fat threeridge and was randomly selected for the fat threeridge take monitoring. The data from this site was also included in this analysis, but no fat threeridge take was observed at that site.

**Vulnerable Sites - Fat Threeridge Take Estimate Based on USFWS Data From One Quantitatively Sampled Fat Threeridge Site and One Corps Randomly Selected Known Fat Threeridge Site**

Site ID	Avg Length Available Habitat per Site (ft)	Summed Length Surveyed Area (ft)	Avg Width Exposed Habitat Surveyed (ft)	Exposed Area (ft <sup>2</sup> )	Density Estimate (individual/ft <sup>2</sup> )	Estimate # Individuals
USFWS C155				3002.4	0.245	736
227	433.00	150.00	1.00	433.00	0.007	3

Site 227 Density Estimate: 1 individual observed in sample area (150ft X 1ft = 150ft<sup>2</sup>) = 1/150 = 0.007

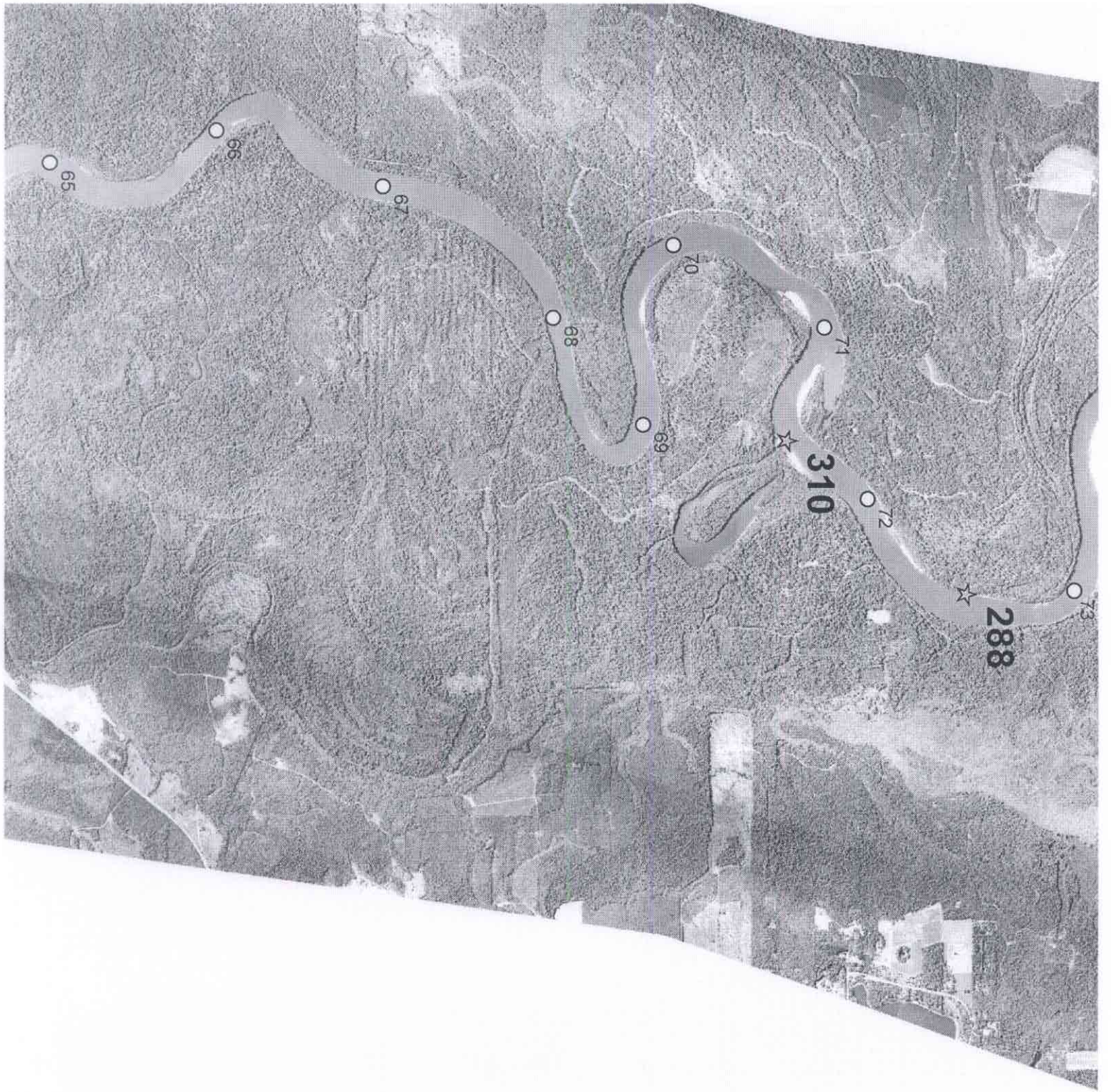
Average Density for Vulnerable Sites =	0.126	AVG C155 and 227
Number of Vulnerable Sites =	6	USFWS provided data
Average Exposed Area at Vulnerable Sites=	1717.7	AVG C155 and 227
<b>Vulnerable Sites Take Estimate=</b>	<b>1299</b>	



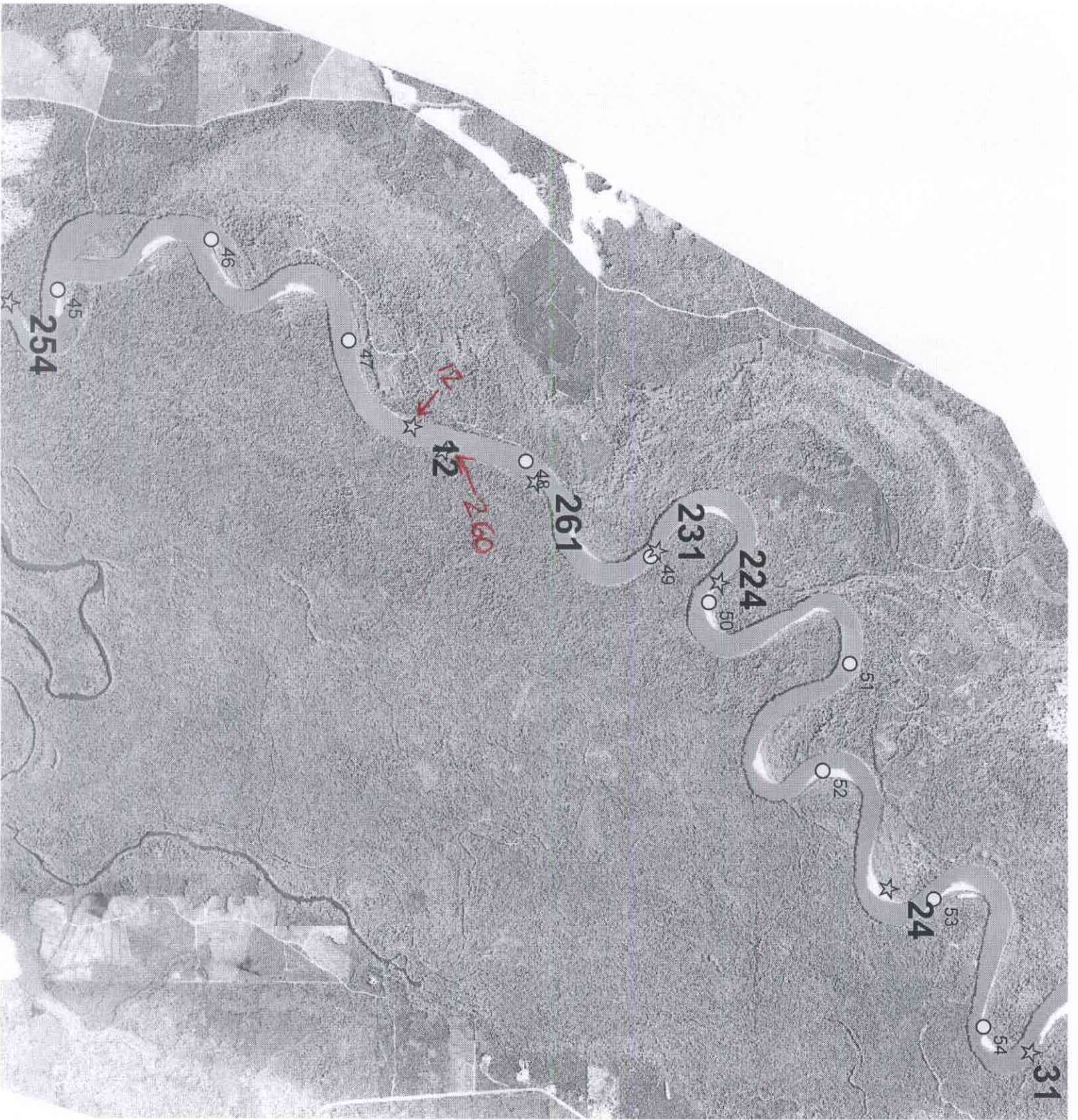


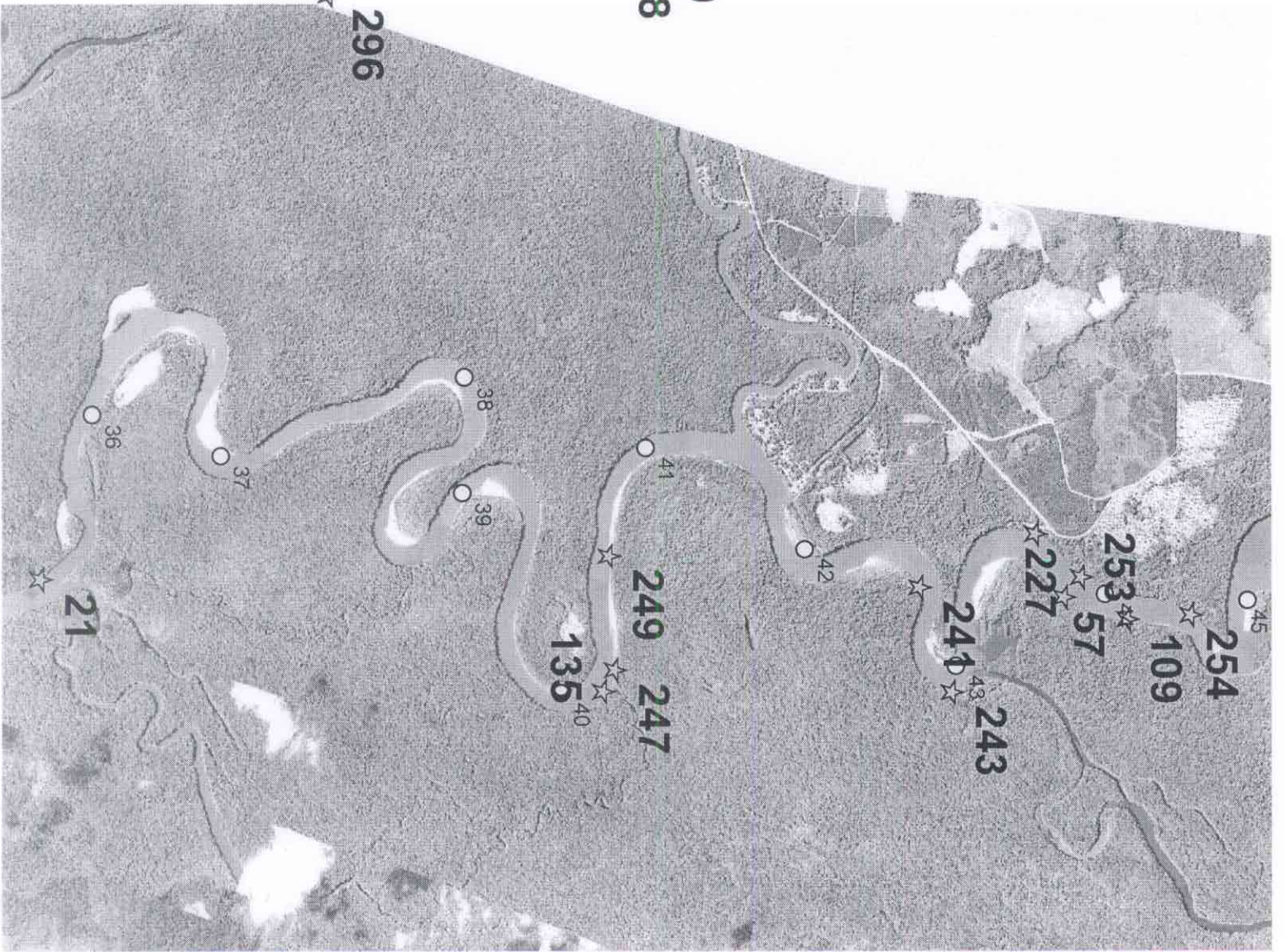












★ 38

★ 360  
★ 298

★ 296

○ 45

254

★ 109

★ 253

★ 57

★ 227

★ 243

★ 241

★

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★

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249 247

★ 135

★ 40

○ 41

○ 38

○ 39

○ 37

○ 36

★ 21

