

TRIP 21 REPORT

AGFD Native Fish Studies

October 26 - November 15, 1993



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Research Branch
Arizona Game and Fish Department
December 1993

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Participants:

Marty Tuegel - AGFD

Ty Gray - AGFD

Glenn Doster - AGFD

Debbie McGuinn-Robbins - AGFD (hiked in at Phantom)

Leann Skrzyński - GCES

Greg Williams - O.A.R.S.

Elizabeth Fuller - O.A.R.S.

John French - O.A.R.S.

Bruce Keller - O.A.R.S.

Kirk Burnett - O.A.R.S.

General Comments:

Flows in the Colorado River ranged from an extreme low of 5-6,000 cfs to a high of around 15-16,000 cfs. Turbidities in the mainstem were low during the entire trip, ranging from 4 to 56 NTUs. The highest turbidities were due to sediment stirred up by daily high dam discharge. Tributaries were all at or near base flows. The Little Colorado River and Havasu Creek were both milky blue in color, with turbidities less than 20 NTUs. Other tributaries were clear. Mainstem temperatures ranged from 10.6°C to 11.5°C, with no apparent warming with increasing downstream distance from the dam. Backwater temperatures ranged from 9.3°C to 13.6°C, and generally were lower than those in the adjacent mainstem. This, coupled with the unusual clarity of the water, resulted in very few fish caught during this trip (322 fish, including 59 humpback chub). Night sampling to help offset the lack of turbidity yielded only slightly more fish than daytime sampling. Tributary temperatures were: Shinumo Creek 8.8°C, Kanab Creek 8.9°C, Havasu Creek 14.3°C.

The numbers of fish seined from backwaters, shallow nearshore mainstem areas, and tributary mouths was drastically reduced from our last trip (September, 1993), during which we caught nearly 5,000 young-of-year fish, including over 2,000 humpback chub. Our sampling does not allow us to conclude whether these fish now occupy different habitats in the mainstem, or have migrated downriver in search of warmer temperatures, or have died, only that they are not found in the areas we sample when the temperatures and turbidities are low. Since Bio/West is sampling this month using different gear types and in different habitats maybe they can determine if young-of-year fish are using mainstem habitats other than backwaters.

An additional factor that may have contributed to the displacement of fish was the lower level of water in the river that resulted in the dewatering of several backwaters just below the confluence of the Little Colorado River that held many fish in September. Whether the fish would have continued to occupy these backwaters had they been maintained by a stable flow regime, despite the cooling temperatures and increasing clarity of the water, is unknown. Possibly the proposed Native Fish Research Flows would permit long term steady flows to enable us to determine how long native fish would continue to use the backwaters before choosing to leave for the main river.

Four young-of-year humpback chub were observed feeding amid *Cladophora* strands on rocks along the shoreline just above the Lava Chuar campsite (river mile 65.3R) on November 1, near the water surface in full sun.

Fourteen humpback chub ranging in length from 24 mm to 41 mm, and three flannelmouth sucker, 33 mm to 37 mm, were caught at the Eminence backwater below President Harding rapid (mile 44.27L). This continues to be the first site at which we find young-of-year fish of these two species. Only one chub (114 mm) was caught below Nevills Rapid (mile 75.5): this fish was found in the small backwater at mile 119.13R (near Blacktail Canyon). No chub were caught in the lower canyon below Lava Falls rapid.

Seven chub were preserved for otolith and stomach analysis (* denotes fish that were found dead, others were handling mortalities):

<u>Total length</u>	<u>Standard length</u>	<u>River mile</u>	<u>Date</u>	<u>Study #</u>
24 mm	20 mm	44.27L	10/28/93	32104
27 mm	22 mm	44.27L	10/28/93	32104
29 mm	24 mm	44.27L	10/29/93	32105
*54 mm	41 mm	61.50L	10/30/93	32109
*44 mm	34 mm	63.08L	10/31/93	32114
*74 mm	57 mm	63.08L	10/31/93	32114
*93 mm	72 mm	63.08L	10/31/93	32114

One larval (13 mm) bluehead sucker was collected at the mouth of Crystal Creek on 1 November.

No fish were tagged during this trip and no previously tagged fish were captured.

Support during this trip was with five 18-foot rowed rafts provided by O.A.R.S. to comply with the non-motorized season requirements of the Park Service. Travel time between sites on the river was lengthened accordingly.

Daily notes:

October 26: Launched from Lee's Ferry. Sampled backwater at mile 2.41R: no fish. Camped at Hot Na Na Wash (mile 16.3L).

October 27: Sampled backwater at Redwall Cavern (mile 33.00L): no fish. Camped at mile 33.7L (Little Redwall).

October 28: Sampled backwaters above and below President Harding rapid (mile 43.35L and mile 44.27L): only one fish, a speckled dace, caught at the upper backwater; 21 fish (10 YOY chub, three YOY flannelmouth suckers, seven rainbow trout, and one dace)

caught in the lower (Eminence) backwater. Mapped and camped at the Eminence site (mile 44.27L).

October 29: Resampled the Eminence backwater: caught only eight fish this time (four YOY chub, one dace, and three rainbow trout). Remapped the backwater and collected quarterly benthos/sediment/plankton samples. Camped at Nankoweap (mile 53.0L).

October 30: Sampled three backwaters between Awatubi (mile 58) and mile 60.1: caught three flannelmouth suckers (32-74 mm), one bluehead sucker (48 mm), and 18 dace. Examined confluence of the Little Colorado River, and observed that the formerly highly productive side channel was nearly completely silted-in and exposed by low flows in both the river and the LCR. Picked up one dead YOY chub in the side channel and saw another stranded YOY chub in a shallow pool on the exposed mud flat at the top end of the Sand Island (unable to recover this fish). Camped at 60.10R backwater.

October 31: Resampled the backwater at 60.10R before dawn: caught only a few fathead minnows and speckled dace. Mapped the backwater. Sampled five backwater and mainchannel locations between the LCR and Carbon Creek (mile 64.60R): caught only four humpback chub (44-93 mm) and one fathead minnow. The river level was exceptionally low (maybe as low as 5,000 cfs) and a well-defined backwater emerged at the Carbon Creek site (mile 64.60R) which we seined after dark: despite deep mud and poor seining efforts we managed to catch six chub (32-52 mm) and 17 fathead minnows in the backwater, and one 67 mm chub and a fathead in the adjacent mainchannel. Camped at Carbon Creek (mile 64.60R).

November 1: Layover day at Carbon Creek - no sampling, although YOY chub were observed along shoreline ledge habitat near Chuar Creek. Hiked up Chuar Creek and

observed numerous fish (dace and/or juvenile trout) up to three or four miles from the river (extent of hike).

November 2: Sampled the backwater at Lava Chuar (mile 65.25L): only dace and a few fatheads were caught. During the previous two days of low flow in the mainstem, this backwater was dewatered. Mapped the site and collected benthos/sediment/plankton quarterly samples. Sampled side channel complex at Tanner (mile 68.39R): caught seven chub (39-63 mm), one 46 mm flannelmouth sucker, 12 bluehead suckers (39-51 mm), and 19 dace. Sampled backwater just below Basalt Canyon (69.48R): two fathead minnows and one dace. Camped at Furnace Flats (upper end of Unkar Delta - mile 72.0R).

November 3: Sampled and mapped Rattlesnake backwater (mile 74.46R): caught four chub (36-45 mm) and a few fatheads. Sampled backwater at mile 75.25R (above Nevills Rapid): caught 21 chub (40-143 mm), one bluehead sucker (66 mm), four fatheads and one adult carp. Camped at Grapevine (mile 81.2L).

November 4: Seined the site just below the Grapevine camp (81.17L) that produced numerous juvenile chub last month: caught only one rainbow trout and three fatheads. Travelled to camp at Cremation (mile 87.2L). Met Debbie McGuinn-Robbins (joining trip) and Tim Hoffnagle (just visiting).

November 5: Sampled the boat beach at Phantom Ranch (mile 87.45R) and backwater just above Granite Rapid (mile 92.37L): one 55 mm bluehead sucker and a few fatheads. Collected a 13 mm bluehead sucker at the mouth of Crystal Creek (mile 98.04R) while scouting the rapid. Camped at Bass Camp (mile 108.2R).

November 6: Seined the mouth of Shinumo Creek (mile 108.60R): only caught one fathead minnow, and observed a large brown trout and one rainbow trout. Hiked up the

creek and observed only one fish above the waterfall - a trout. Camped again at Bass Camp.

November 7: Sampled the Monument Fold site (mile 117.40R): caught only fathead minnows. Sampled, mapped, and collected benthos/sediment/plankton quarterly samples at backwater at mile 119.13R: caught only fathead minnows. Resampled the same backwater at night and caught one humpback chub (114 mm), one flannelmouth sucker (73 mm), one rainbow trout and a few fathead minnows. Camped at the site (mile 119.13R).

November 8: Sampled three backwaters between Blacktail and Forster Canyons: caught one bluehead sucker (36 mm) and several fathead minnows. Camped across from Deer Creek (mile 136L).

November 9: Sampled the backwater at Poncho's Kitchen (mile 137.12L): no fish. Stopped at Kanab Creek and saw no fish in the stream or near the mouth of the creek (water temperature 8.9°C in the creek, 10.4°C in the mainstem). Camped at Last Chance (mile 156.3R) above Havasu Creek.

November 10: Seined in Havasu Creek from the mouth to the first cascade: caught one bluehead sucker (43 mm) and one dace. Hiked up the creek and observed several speckled dace in a plunge pool, and numerous small bluehead suckers and a few dace in a very clear off-channel pool. Camped at mile 165L (below Tuckup).

November 11: Sampled the backwater at mile 168.75R (below Fern Glen): 3 bluehead suckers (19-56 mm), one dace, one fathead, one carp. Weather turned severe so we camped early at mile 176L.

November 12: Ran Lava Falls in the morning and sampled a backwater fed by a warm spring at mile 181.15L: one bluehead sucker (36 mm), one dace and a few fathead

minnows. The temperature in this backwater was as high as 23.4°C near the spring source, the pH was 6.6, the conductivity was 1240 microsiemens, and the dissolved oxygen was 6.1 mg/liter (72% saturation). There are other warm springs and seeps in this area, and these may provide potential spawning areas for chub and suckers and explain our collection of small YOY chub in backwaters in the lower canyon during previous trips. Camped at mile 189L.

November 13: Sampled inundated backwater at mile 192.42R: a few YOY bluehead suckers, dace, and fathead minnows. Seined, mapped, and collected benthos/sediment/plankton quarterly samples at backwater at mile 193.85R: caught only dace and fathead minnows. Camped at mile 202R.

November 14: No sampling. Travelled to Diamond Creek (mile 225.7L) to de-rig boats and camp.

November 15: Take out and return to Flagstaff.

Table 1. List of studies and sites from Trip 21, October 26 - November 15, 1993.

Study	Sites	Date-Time	Mile	Rch	Flo Cod	Flow CFS	Typ A	Typ B	Ang Inq	Opp	Som de	Ben ths	Sed	Chl	Pkn	Tot Map	Pla Map	Vis cer	Dri ft	-A- 2nd	Fah Coll
32101	2	10/26/93	11:32	2.41	L 20	AC	10000	.	.	.	2	.	.	.	.	.	.	.	.	.	0
32102	1	10/27/93	14:50	33.00	L 20	AC	9000	.	.	.	1	.	.	.	.	.	.	.	.	.	0
32103	2	10/28/93	12:04	43.35	L 20	DC	9000	.	.	.	2	.	.	.	.	.	.	.	.	.	1
32104	2	10/28/93	14:30	44.27	L 20	DC	8000	1	.	.	.	.	.	.	.	.	1	.	.	.	21
32105	2	10/29/93	09:30	44.27	L 20	DC	10000	1	.	.	.	12	12	.	4	.	1	.	.	.	8
32106	4	10/30/93	11:03	58.23	R 20	DC	9000	.	.	.	4	.	.	.	.	.	.	.	.	.	1
32107	1	10/30/93	12:53	58.68	L 20	DC	8000	.	.	.	1	.	.	.	.	.	.	.	.	.	21
32108	1	10/30/93	14:20	60.10	R 20	DC	7000	.	.	.	1	.	.	.	.	.	1	.	.	.	1
32109	0	10/30/93	15:00	61.50	L 22	DC	7000	.	.	.	.	.	.	.	.	.	.	.	.	.	1
32110	1	10/31/93	06:25	60.10	R 20	DC	7000	.	.	.	1	.	.	.	.	.	1	.	.	.	6
32111	1	10/31/93	10:15	61.50	L 30	DC	7000	.	.	.	1	.	.	.	.	.	.	.	.	.	0
32112	1	10/31/93	10:30	61.54	R 30	DC	7000	.	.	.	1	.	.	.	.	.	.	.	.	.	0
32113	2	10/31/93	11:02	62.25	R 30	DC	6000	.	.	.	2	.	.	.	.	.	.	.	.	.	0
32114	2	10/31/93	13:44	63.08	L 30	DC	6000	.	.	.	2	.	.	.	.	.	.	.	.	.	4
32115	1	10/31/93	15:00	63.43	R 30	DC	6000	.	.	.	1	.	.	.	.	.	.	.	.	.	1
32116	2	10/31/93	16:40	64.60	R 30	DC	6000	.	.	.	2	.	.	.	.	.	.	.	.	.	31
32117	2	11/02/93	09:30	65.25	L 30	AC	11000	1	.	.	.	12	12	.	4	.	1	.	.	.	52
32118	2	11/02/93	13:20	68.39	R 30	DC	10000	.	.	.	2	.	.	.	.	.	.	.	.	.	45
32119	1	11/02/93	15:00	69.48	R 30	DC	9000	.	.	.	1	.	.	.	.	.	.	.	.	.	3
32120	2	11/03/93	10:40	74.46	R 30	DC	16000	1	.	.	.	.	.	.	.	.	1	.	.	.	8
32121	2	11/03/93	13:35	75.25	R 30	DC	16000	.	.	.	2	.	.	.	.	.	.	.	.	.	28
32122	1	11/04/93	09:00	81.17	L 30	AC	18000	.	.	.	1	.	.	.	.	.	.	.	.	.	4
32123	1	11/05/93	08:25	87.45	R 30	AC	10000	.	.	.	2	.	.	.	.	.	.	.	.	.	1
32124	1	11/05/93	11:36	92.37	L 40	DC	15000	.	.	.	1	.	.	.	.	.	.	.	.	.	2
32125	0	11/05/93	13:30	98.04	R 41	DC	15000	.	.	.	.	.	.	.	.	.	.	.	.	.	1
32126	2	11/06/93	10:35	108.60	R 40	AC	13000	.	.	.	2	.	.	.	.	.	.	.	.	.	1
32127	2	11/07/93	12:32	117.40	R 40	DC	8000	.	.	.	2	.	.	.	.	.	.	.	.	.	19
32128	2	11/07/93	14:11	119.13	R 40	AC	8000	1	.	.	.	9	9	.	3	.	1	.	.	.	2
32129	2	11/07/93	18:46	119.13	R 40	AC	8500	.	.	.	2	.	.	.	.	.	.	.	.	.	6
32130	2	11/08/93	09:15	120.47	L 40	DC	7000	.	.	.	2	.	.	.	.	.	.	.	.	.	0
32131	1	11/08/93	10:10	121.17	L 40	DC	7000	.	.	.	1	.	.	.	.	.	.	.	.	.	0
32132	1	11/08/93	10:50	122.55	L 40	DC	7000	.	.	.	1	.	.	.	.	.	.	.	.	.	13
32133	2	11/09/93	09:25	137.12	L 40	AC	8000	.	.	.	2	.	.	.	.	.	.	.	.	.	0
32134	1	11/10/93	10:30	156.93	L 46	AC	8000	.	.	.	2	.	.	.	.	.	.	.	.	.	2
32135	2	11/11/93	10:15	168.75	R 50	DC	9000	.	.	.	3	.	.	.	.	.	.	.	.	.	6
32136	1	11/12/93	11:15	181.15	L 50	DC	9000	.	.	.	1	.	.	.	.	.	.	.	.	.	7
32137	1	11/13/93	09:45	192.42	R 50	DC	11000	.	.	.	3	.	.	.	.	.	.	.	.	.	6
32138	2	11/13/93	10:50	193.85	R 50	DC	10000	1	.	.	.	12	12	.	4	.	1	.	.	.	19
Sum	58							6	.	.	51	.	45	45	.	15	.	8	.	.	321

Table 2. Length frequencies for each species, Trip 21, October 26 - November 15, 1993.

Length Interval	Species						
	BHS	CRP	FHM	FMS	HBC	RBT	SPD
10 - 19	2						
20 - 29			44		8		
30 - 39	6		62	3	7		21
40 - 49	12		12	1	16		18
50 - 59	4		8	1	5		1
60 - 69	2		2	1	7	1	
70 - 79				2	1	2	
80 - 89					2	1	1
90 - 99					4	1	
100 - 109					2	1	
110 - 119					2		
120 - 129					1	1	
130 - 139					2	1	
140 - 149					2		
230 - 239						1	
320 - 329						1	
340 - 349						1	
410 - 419						1	
500 - 509						1	
510 - 519		1					

Table 3. Length frequencies for each species, by reach, Trip 21.
October 26 - November 15, 1993.

Length Interval	REACH																											
	Reach 20					Reach 30					Reach 40					Havasau		Reach 50										
	SPECIES					SPECIES					SPECIES					SPECIES		SPECIES										
	BHS	FHM	FMS	HBC	RBT	SPD	BHS	CRP	FHM	FMS	HBC	RBT	SPD	BHS	FHM	FMS	HBC	RBT	BHS	SPD	BHS	CRP	FHM	FMS	SPD			
10 - 19																												
20 - 29																												
30 - 39			3	8					22						1													
40 - 49	1		2	2					38						18													
50 - 59		2	1	4					8	1					16													
60 - 69		1							6						2													
70 - 79					1				1						1													
80 - 89					2																							
90 - 99					1				1																			
100 - 109																												
110 - 119																												
120 - 129																												
130 - 139																												
140 - 149																												
230 - 239																												
320 - 329																												
340 - 349																												
410 - 419																												
500 - 509																												
510 - 519																												

Table 4. Length frequency for each species, by gear type, Trip 21, October 26 - November 15 1993.

Gear Code	Species						
	BHS	CRP	FHM	F M S	HBC	RBT	SPD
Large bag seine (30 X 6 X 1/8)							
10 - 19	2						
20 - 29			22		8		
30 - 39	4		30	2	6		6
40 - 49	2		6		12		5
50 - 59	2		3		4		
60 - 69	2		2		5	1	
70 - 79				2	1	2	
80 - 89					2	1	1
90 - 99					4	1	
100 - 109					2	1	
110 - 119					2		
120 - 129					1	1	
130 - 139					2	1	
140 - 149					2		
230 - 239						1	
320 - 329						1	
340 - 349						1	
410 - 419							
500 - 509		1					
510 - 519		1					
Straight Block seine (50 x 6 x 3/16)							
20 - 29			22				
30 - 39	2		32	1	1		15
40 - 49	10		6	1	4		13
50 - 59	2		5	1			1
60 - 69				1	2		
410 - 419						1	

Table 5. Number measured, mean length, minimum length, maximum length for each species collected by reach, Trip 21, October 26 - November 15, 1993.

Species	Reach				
	20	30	40	Havasu	50
BHS					
LENGTH					
Valid N	1	13	4	1	7
Mean	48	46	43	43	39
Minimum	48	39	13	43	19
Maximum	48	66	67	43	56
CRP					
Valid N		1			1
Mean	.	500	.	.	515
Minimum	.	500	.	.	515
Maximum	.	500	.	.	515
FHM					
Valid N	3	75	36		14
Mean	58	35	30	.	34
Minimum	50	23	24	.	24
Maximum	69	66	46	.	47
FMS					
Valid N	5	1	1		1
Mean	47	46	73	.	65
Minimum	32	46	73	.	65
Maximum	74	46	73	.	65
HBC					
Valid N	14	43	1		
Mean	31	70	114	.	.
Minimum	24	32	114	.	.
Maximum	41	143	114	.	.
RBT					
Valid N	10	1	1		
Mean	157	410	94	.	.
Minimum	64	410	94	.	.
Maximum	343	410	94	.	.
SPD					
Valid N	22	6		2	11
Mean	40	46	.	40	38
Minimum	32	36	.	38	32
Maximum	50	82	.	41	46

Table 6. Number of each species collected and species composition by reach, Trip 21, October 26 - November 15 1993.

Species	Reach					Total
	20	30	40	Havasu	50	
BHS						
Number caught						
Sum	1	16	4	1	7	29
%	1.8	9.2	9.3	33.3	20.6	9.4
CRP						
Number caught						
Sum	.	1	.	.	1	2
%		.7			2.9	.7
FHM						
Number caught						
Sum	4	98	36	.	17	155
%	5.5	53.9	83.7		41.2	46.7
FMS						
Number caught						
Sum	6	1	1	.	1	9
%	9.1	.7	2.3		2.9	2.9
HBC						
Number caught						
Sum	14	43	1	.	.	58
%	25.5	30.5	2.3			21.0
RBT						
Number caught						
Sum	10	1	1	.	.	4.3
%	18.2	.7	2.3			12
SPD						
Number caught						
Sum	24	6		2	12	44
%	40.0	4.3	.	66.7	32.4	14.9
TOTAL						
Sum	59	166	43	3	38	309

Table 7. Catch-per-unit-effort and total catch for seines, by species, Trip 21, October 26 - November 15, 1993.

Catch-per-Unit-Effort	GEAR
	Seine
BHS	
Mean	.17
Minimum	
Maximum	3.75
CRP	
Mean	.01
Minimum	
Maximum	.50
FHM	
Mean	1.02
Minimum	
Maximum	13.94
FMS	
Mean	.11
Minimum	
Maximum	4.44
HBC	
Mean	.39
Minimum	
Maximum	10.00
RBT	
Mean	.04
Minimum	
Maximum	1.43
SPD	
Mean	.63
Minimum	
Maximum	40.00

Total Catch	GEAR
	Seine
BHS	
Mean	0
Minimum	
Maximum	15
CRP	
Mean	0
Minimum	
Maximum	1
FHM	
Mean	2
Minimum	
Maximum	32
FMS	
Mean	0
Minimum	
Maximum	3
HBC	
Mean	1
Minimum	
Maximum	20
RBT	
Mean	0
Minimum	
Maximum	7
SPD	
Mean	1
Minimum	
Maximum	18

Table 8. Total effort and number of seine hauls, by reach, Trip 21, October 26 - November 15, 1993.

REACH	EFFORT	HAULS
	Sum	Sum
20	5,010	30
30	7,621	29
40	2,266	19
46	380	2
50	3,594	13
TOTAL	18,871	93

Table 9. Seine effort (m²) and catches, by species and reach, Trip 21, October 26 - November 15, 1993.

	EFFORT	HAULS	BHS CATCH	CRP CATCH	FHM CATCH	FMS CATCH	HBC CATCH	RBT CATCH	SPD CATCH
REACH	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum
20	5,010	30	1		4	6	14	10	24
30	7,621	29	16	1	98	1	43	1	6
40	2,266	19	3		36	1	1	1	
46	380	2	1						2
50	3,594	13	7	1	17	1			12
TOTAL	18,871	93	28	2	155	9	58	12	44

Table 10. Seine effort (m²) and catches, by species and habitat type, Trip 21, October 26 - November 15, 1993.

HAB CD	EFFORT	HAULS	BHS CATCH	CRP CATCH	FHM CATCH	FMS CATCH	HBC CATCH	RBT CATCH	SPD CATCH
	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum
BE	175	1			1				
CB	7,609	42	5	1	99	5	31	3	39
CO	210	1							
IB	1,470	6				3	10	7	1
IP	46	1					4		
MC	2,568	16	1		13		6	1	
ME	5,485	19	4	1	14			1	2
MS	120	1							
SC	768	3	17		27	1	7		
TM	20	2			1				
TS	130	1	1						2
TOTAL	18,871	93	28	2	155	9	58	12	44

Table 11. Seine effort (m²) and catches, by species and temperature (°C), Trip 21, October 26 - November 15, 1993.

	EFFORT	HAULS	BHS CATCH	CRP CATCH	FHM CATCH	FMS CATCH	HBC CATCH	RBT CATCH	SPD CATCH
TEMP	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum
9	124	2			5				2
10	3,206	15	1		12	3	10	7	1
11	10,961	49	8	1	56	1	16	5	4
12	3,351	18	17	1	77	5	28		33
13	558	3							1
14	599	5	1				4		2
23	72	1	1		5				1
Total	18,871	93	28	2	155	9	58	12	44

Table 12. Seine effort (m²) and catches, by turbidity (NTUs), Trip 21, October 26 - November 15, 1993.

TURBIDITY LEVEL	EFFORT	HAULS	BHS CATCH	CRP CATCH	FHM CATCH	FMS CATCH	HBC CATCH	RBT CATCH	SPD CATCH
	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum
< 570 NTU	12,855	64	27	2	109	5	36	2	28
Total	12,855	64	27	2	109	5	36	2	28

Table 13. Mean turbidity (NTU's), by reach, Trip 21, October 26 - November 15, 1993.

REACH	TURB_N
	Mean
20	12
30	20
40	10
46	18
50	16