

**COLORADO RIVER RECOVERY PROGRAM
FY-2008–2009 PROPOSED SCOPE OF WORK**
Middle Yampa smallmouth bass and northern pike

Project No.: 125

Lead Agency: Colorado State University

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Category:

- Ongoing project
 Ongoing-revised project
 Requested new project
 Unsolicited proposal

Expected Funding Source:

- Annual funds
 Capital funds
 Other (explain)

I. Title of Proposal:

Evaluation of smallmouth bass and northern pike management in the middle Yampa River

II. Relationship to RIPRAP (March 28, 2004 version @ <http://www.r6.fws.gov/crrip/rip.htm>)

Green River Action Plan: Yampa and Little Snake rivers

III Reduce negative impacts of nonnative fishes and sportfish management activities (nonnative and sportfish management).

III.A.1. Implement Yampa Basin aquatic wildlife management plan to develop nonnative fish control programs in reaches of the Yampa River occupied by endangered fishes. Each control activity will be evaluated for effectiveness and then continue as needed.

III.A.1.b. Remove and translocate northern pike from the Yampa River.

III. Study Background/Rationale and Hypotheses

¹ See last page for revision changes and dates.

In the Yampa River, nonnative piscivorous smallmouth bass *Micropterus dolomieu* and northern pike *Esox lucius* are a predatory and competitive threat to native and endangered fishes. Northern pike have occupied the river for just over 25 years and smallmouth bass have occupied the river in significant numbers only since 1992. Northern pike were stocked into the tributary Elkhead Reservoir in the late 1970's, about the same time they first occurred in the Yampa River. In addition to Elkhead Reservoir, northern pike now occur throughout the Yampa River and portions of the middle Green River, both upstream and downstream of the Yampa River confluence, and in addition to Elkhead Reservoir they now have self-sustaining populations in Stagecoach and Catamount reservoirs where they were illegally introduced.

Smallmouth bass were extremely rare in the Yampa River until a rapid draw down of Elkhead Reservoir for dam maintenance in 1992 introduced large numbers of smallmouth bass into the Yampa River. Bass are now abundant throughout the Yampa River downstream of Elkhead Creek. The loss of fish from the reservoir was so great in 1992 that local fishermen reported a significant decline in the smallmouth bass fishery in Elkhead Reservoir immediately after the draw down. Prior to that it appeared that smallmouth bass rarely escaped from the reservoir. In the 1983 and 1984, smallmouth bass were extremely rare comprising only 0.3% of the fish community and native fish were common comprising 68% of all fish captured. (Wick et al.1985). Smallmouth bass numbers are now extremely high, comprising 51% of all fish captured in 2007 and native fish numbers are now extremely low comprising just 3.3 % of all fish captured. Smallmouth bass are also considered food-resource competitors with Colorado pikeminnow *Ptychocheilus lucius* due to their predation of small, prey-sized fish typically consumed by pikeminnow. The small-fish prey base has precipitously declined concurrently with the invasion of smallmouth bass and drought-related warmer water temperatures (Bestgen et al (2007)). Smallmouth bass have expanded their range into Dinosaur National Monument and pose a great threat to young endangered fishes that reside there.

Both northern pike and smallmouth bass occupy reaches designated as critical habitat for the federally endangered Colorado pikeminnow, razorback sucker *Xyrauchen texanus*, humpback chub *Gila cypha*, and bonytail *G. elegans*. Northern pike are known predators of wild Colorado pikeminnow (Hawkins unpublished data) and stocked razorback sucker and are presumed predators of humpback chub and recently reintroduced bonytail. Northern pike also pose a significant predation threat to other native species such as roundtail chub *G. robusta*, flannelmouth sucker *Catostomus latipinnis*, and bluehead sucker *C. discobolus* (Martinez 1995). Northern pike were rated the 3rd greatest nonnative species of concern by experts in the Upper Colorado River Basin based on the potential effects of pike predation on endangered and other native fishes (Hawkins and Nesler 1991). Smallmouth bass were ranked low on the list of species of concern but the ranking questionnaire was completed before their 1992 influx into the Yampa River. The Upper Colorado River Endangered Fish Recovery Program (Recovery Program) determined that management actions to reduce abundance of

nonnative piscivorous fish was necessary to recover endangered fishes in the Upper Basin. The Colorado Division of Wildlife (CDOW), a Recovery Program participant, developed an Aquatic Wildlife Management Plan for the Yampa River Basin (Yampa Aquatic Plan) that recommended managing the reach downstream of Craig, Colorado, for native and endangered fishes by removing smallmouth bass *Micropterus dolomieu*, channel catfish *Ictalurus punctatus*, and northern pike. The Yampa Aquatic Plan recommended removal of these three species from the river and relocating them to other waters within the Yampa Basin to provide continued sport-fishing opportunities (CDOW 1998). Removing northern pike from critical habitat should temporarily reduce predation pressure on endangered fishes and reduce the influx of northern pike to downstream river systems. Reducing the abundance of smallmouth bass in the Yampa River should reduce predation pressure on native fish, increase forage for Colorado pikeminnow, and reduce the numbers that move to downstream endangered fish nursery areas such as Yampa Canyon.

The work described in this SOW focuses primarily on smallmouth bass removal and evaluation and secondarily provides additional removal of northern pike to supplement northern pike removal by CDOW (Project 98a). Specifically, northern pike will be removed concurrently within smallmouth bass study reaches. There is currently no plan for removal of channel catfish in this study area.

IV. Study Goals, Objectives, End Product:

Smallmouth bass

The goal is to remove as many smallmouth bass as possible from two sites on the Ympa River, one is a 24-mile reach in Little Yampa Canyon and the other is a 5-mile reach in Lily Park .

Objectives:

1. Obtain an estimate of the number of smallmouth bass in Little Yampa Canyon and Lily Park using a mark-recapture abundance estimator.
2. Conduct one marking pass and seven removal passes in Little Yampa Canyon and Lily Park.
3. Calculate the proportion of smallmouth bass removed from each study area based on initial population size and compare capture rates on each sample pass over time.
4. Remove large numbers of age-0 and age-1 smallmouth bass from a 12-mile treatment reach in Little Yampa Canyon to supplement Recovery Program Project 140 (Native fish response evaluation).

Northern pike

The goal is to remove as many pike as possible from critical habitat and estimate the proportion of the population removed. (Primarily accomplished by Project 98a and supplemented by this Project (#125).

Objectives

1. Obtain an estimate of the number of northern pike that reside in the 91-mile study reach in the Yampa River using a mark-recapture abundance estimator. (In coordination with Project 98a).
2. Conduct one marking pass and seven removal passes for northern pike from the smallmouth bass study reaches to support Project 98a.
3. Calculate the proportion of northern pike removed based on initial population size. (In coordination with Project 98a).

V. Study area:

Our research will focus on two smallmouth bass study reaches in the Yampa River, Colorado, a 24-mile reach in Little Yampa Canyon between Round Bottom (RM 124) and about 1-mile upstream of Government Bridge (RM 100) and a 5-mile reach at Lily Park between Cross Mountain Canyon (RM 55.3) and the Little Snake River confluence (RM 50.3). The northern pike study reach is part of a larger study for Project 98a which is 91 miles long and is located between Craig, Colorado (River Mile, RM 136) and Yampa Canyon (RM 45) and our contribution will be the removal of northern pike from the two study reaches described for bass.

Sampling Dates

Sampling for adult smallmouth bass will occur primarily between April and July, during runoff. Both northern pike and smallmouth bass are susceptible to electrofishing when they occupy shallow shoreline and flooded off-channel habitats. Spring runoff sampling is preferred to other seasons because adults are more susceptible to electrofishing capture from shallow shorelines, higher flows allow safer navigation, and cool water temperatures allow successful transport of live fish. As discharge declines and water clears, young smallmouth bass become more susceptible to capture. From July through August young bass will be removed only from the lower 12-miles of the LYC reach, which maintains the 12-mile Control-Treatment reaches originally designated and sampled in 2004 and 2005 for small, smallmouth bass in support of Recovery Program Project 140..

VI. Study Methods/Approach

Sampling will focus on two main areas, a 24-mile reach in and around Little Yampa Canyon (LYC) and a 5-mile reach at the upper end of Lily Park. The 24-mile reach in LYC was previously divided into two 12-mile Control and Treatment reaches in 2004 and 2005. In 2006, these two reaches were combined into one 24-mile control (removal) reach because of mixing of fish between the two 12-mile control and treatment reaches. In 2007, we will attempt to complete at least eight sample passes in Little Yampa Canyon and Lily Park. During the first pass at both sites, smallmouth bass and northern pike will be marked and released alive. On seven subsequent passes, smallmouth bass and northern pike will be removed from the river. The purpose of marking fish on the first pass is to use the recapture of tagged fish to estimate the initial size of the population before removal. The number of fish removed as a proportion of the population size provides a measure of removal efficiency. This estimate also provides a measure of change in the population over several years.

We estimate it will require 7 removal passes to remove at least 65% of the targeted aggregation of smallmouth bass based on previous capture probability that averaged 15% between 2004 and 2007. This is based on the following formula (personal communication K. Bestgen).

$$R = 1 - (1 - p)^n, \text{ where:}$$

R = percent removal

p = capture probability

n = number of removal passes

Solving for n results in the following:

$$n = \log(1 - R) / \log(1 - p), \text{ where}$$

$R = 65\%$, targeted rate of removal

$p = 15\%$, average capture probability, and

$n = 7$ passes, estimated number of removal passes required to obtain 65% removal.

In 2005, reporting results of northern pike control (Project 98a) in the middle Yampa River became primarily the responsibility of the CDOW. CDOW study sites for northern pike include critical habitat reaches adjacent to our study site including RM 136-124, RM 100-90, and RM 90-60. We will assist CDOW by capturing and handling northern pike in the smallmouth bass study areas in a manner that is compatible with the objectives of Project 98a. On the first pass we will mark northern pike with numeric Floy tags and on subsequent samples we will remove northern pike.

Sample techniques have been modified to increase the catch of young smallmouth bass concurrently with larger adult sampling. Areas with abundant young smallmouth bass will be sampled rigorously using modified electrofishing techniques and smaller mesh dipnets to increase the catch of smaller-sized bass. In addition, starting in mid-July

when flow recede, removal will shift to young, smallmouth bass (≤ 200 mm) and continue through August in the lower 12 miles of the LYC site using electric seine, boat or backpack electrofisher, seines and nets. We may also try other gear as necessary including trap nets or cages and possibly baited or scented attractants (Table 1). We will conduct at least three separate sampling occasions, in July and August, each about 10 days long and reaches will be sampled multiple times on each occasion.. Removal will occur over the 12-mile treatment reach as established in 2004 and 2005. All nonnative species will be handled as specified in Table 2 or as specified by CDOW collecting permit. A summary of collecting gear, fish handling, tagging, and disposition of each species is provided in Tables 1 and 2 for State of Colorado scientific collecting permit application.

In summary, smallmouth bass sampling and removal will be restricted to the Little Yampa Canyon and Lily Park reaches unless we are assisting CDOW crews in other reaches. Smallmouth bass in the treatment reach of Little Yampa Canyon and Lily Park will be sampled eight times (one mark and release, seven removal passes), during large bodied fish sampling from April through mid-July. Northern pike will also be sampled in the smallmouth bass study reaches with fish marked on the first pass and fish removed subsequent passes. In 2007, smallmouth bass will be moved to Elkhead Reservoir and possibly a few to Craig Justice Center ponds and northern pike will be moved to Loudy Simpson pond as directed by CDOW. See Table 2 for sizes of each species that will be tagged, euthanized, or moved.

Generally fish will be captured by boat electrofishing both shorelines concurrently, although other gear types may be used (Table 1). A third boat will be used to process, maintain, or transport live fish. Off-channel habitats such as backwaters and flooded tributaries will be sampled with block and shock, seining, trammel nets, or fyke nets. Pike and bass will be handled concurrently in the bass study reaches. Capture locations will be identified to the nearest 1/2 mile. Fish handling time will be reduced by subsampling lengths and weights of fish, except for tagged or recaptured fish, which we will measure and weigh. All sizes of northern pike and smallmouth bass ≥ 100 mm TL will be tagged with numbered Floy tags (Color = Yellow) on the marking pass. On the removal passes all fish that are moved to ponds or reservoirs will be marked with a specially assigned number range in order to clearly detect them as escapees if they return to the river. Tags on recaptured fish will be removed prior to tagging with the specially assigned number range. Endangered fishes and roundtail chub will be handled per guidelines and permits of the CDOW and the USFWS. All Colorado pikeminnow and roundtail chub will be captured, PIT tagged per Recovery Program protocol, their location recorded within 0.1 mile, and UTM coordinates recorded. We will record tag data for all recaptured fish originally tagged by other agencies. All fish will be examined for external injury from sampling gear or pike attacks.

Northern pike removed from the river will be translocated to Loudy Simpson pond in Craig or other locations as identified by CDOW. If fish are to be moved to locations outside of the Craig-Hayden area, then we will transfer fish to CDOW staff at the boat ramp or in Craig for further transport. We will also collaborate with CDOW biologists and researchers to provide them with euthanized fish as requested for other

research. Any fish killed will be euthanized and provided to CDOW researchers, kept as a voucher specimen and cataloged in the LFL collection, or disposed of by burying.

Because we primarily capture only target species such as smallmouth bass, pike, and pikeminnow, we often do not maintain records of other species observed during sampling. In order to monitor the relative abundance of other species in the study site, we will sample the fish community at four, 1-mile sections in Little Yampa Canyon and one, 1-mile section at Lily Park by capturing and recording length and weight for all fish species in that reach. We will document spawning timing and location by documenting sexual condition of target species over time, especially by their production of gametes (ripeness). We will watch for male bass guarding nests and document locations and habitats. Young bass will be removed from active nests and nest sites physically disrupted.

Young smallmouth bass control

A primary measure of the effectiveness of removal of smallmouth bass is the Native Fish Response Project (# 140) that will evaluate the response of native fishes to removal. To measure a response in the native fish community requires a large removal effect. Work described in this SOW primarily targets removal of adult smallmouth bass from a 24-mile treatment area in Little Yampa Canyon and from a 5-mile treatment area at Lily Park. But even with adult removal, Young of year (YOY) and yearling smallmouth bass were the most abundant species collected during fall sampling in 2003 and 2004 (Bestgen et al. 2007). Anderson (2004) also found Age-0 smallmouth bass were the most abundant fish < 120 mm collected in this area. Smallmouth bass Age-1 and younger exploit shallow habitat unavailable to larger bass and this behavior combined with their high abundance results in a high predation pressure on young native fishes. Although spring removal targets primarily juvenile and adult smallmouth bass, smaller juveniles (<200 mm) will be removed in large numbers during the latter portion of the large fish sampling in June and July as flows decline and water clarity improves. To enhance removal of young fish we will removal YOY and yearling bass from mid-July through August during base flow using an electric seine. Although adult smallmouth bass removal was expanded to the entire 24 miles study site in LYC, we will only remove small smallmouth bass in the lower 12-mile treatment reach to maintain consistency with previous 12-mile Control Treatment reaches used in the Native fish Response Project 140.

We will assist as needed with Recovery Program or CDOW information and education efforts in the Yampa Valley. Primarily we will do this by providing information during informal contact with two important target groups: landowners near the river and anglers that fish the river or receiving waters.

VII. Task Description and Schedule

Task 1	Oct-Jan	Prepare and present results at three annual Recovery Program meetings: nonnative workshop, nonnative summit workshop, and Researcher's Meeting.
Task 2	Feb- Mar	Contact landowners and obtain permission for property access for sampling. Attend agency and public meetings. Hire and train field crew; purchase, prepare, and fabricate equipment.
Task 3	Apr - Jul	Yampa River sampling in Critical Habitat. Capture, remove and translocate smallmouth bass and northern pike.
Task 4	Jul- Aug	Capture and remove YOY and yearling smallmouth bass from treatment sites.
Task 5	Aug - Oct	Equipment maintenance. Data entry and analysis. Prepare Recovery Program annual progress report. Interaction and data sharing with DOW aquatic researchers.

VIII. FY-2008 and FY-2009 Work

Deliverables/Due Dates:

Recovery Program Annual Report: Nov 11, 2008

FY-2008 Budget by Task (see footnotes for details)

Task 1:	Biologist-Researcher IV (1340/week-4 wks)	5360
	Biologists-Researcher II (750/week- 4 wks)	3000
	Travel-Lodging (\$80/night x 2 nights/trip x 3 people x 3 trips)	1440
	Travel-Per diem (\$39/day x 3 days/trip x 3 people x 3 trips)	1053
	Truck mileage (\$0.32/mile x 500 miles/trip x 3 trips)	480
	Total Task 1	11333
Tasks 2:	Biologist-Researcher IV (1340/week-4 wks)	5360
	Biologist-Researcher II (750/week- 4 wks)	3000
	Travel-Lodging (\$80/night x 4 nights/trip x 2 people x 2 trips)	1280
	Travel-Per diem (\$39/day x 5 days/trip x 2 people x 2 trips)	780
	Truck mileage (\$0.32/mile x 560 miles/trip x 2 trips)	360
	Total Task 2	10780
Task 3:	Biologist-Researcher IV (1340/week x 16 wks)	21440

	Biologist-Researcher II (2 x 750/week x 16 wks)	24000
	Technicians (4 x 623/week x 16 wks)	39872
	Travel-Lodging-rental house (\$1100/month x 4 months)	4400
	Travel-Per diem (\$20/day x 10 days/trip x 7 people x 7 trips)	9800
	Truck Insurance and motorpool fees (\$380 annually X 3 trucks)	1140
	Truck mileage -1-ton fish hauler (\$0.48/mile x 900 miles/trip x 7 trips)	3024
	Truck mileage -3/4 ton people hauler (\$0.32/mile x 900 miles /trip x 7 trips)	2016
	Truck mileage -1-ton people hauler (\$0.59/mile x 900 miles /trip x 7 trips) .	3717
	Boat gas (\$1900/boat/season x 3 boats)	5700
	Boat motor 2-stroke oil (20 gallons X \$27/gallon)	540
	Boat repair and maintenance	1100
	Field supplies (net handles, nets, boots, first aid, electrical safety gloves, tools batteries, handheld GPS)	800
	Fish transport supplies (compressed O2 bottles, O2 regulator, salts)	300
	Services (welding, rigging, field repair)	<u>500</u>
	Total Task 3	118349
Task 4	Biologist-Researcher IV (1340/week x 4 wks)	5360
	Biologist-Researcher II (2 x 750/week x 4 wks)	6000
	Technicians (3 x 623/week x 4 wks)	7476
	Travel-Lodging-rental house (\$1100/month x 1 month)	1110
	Travel-Per diem (\$20/day x 10 days/trip x 6 people x 4 trips)	4800
	Truck mileage -3/4 ton people hauler (\$0.32/mile x 900 miles /trip x 4 trips)	1152
	Truck mileage -1-ton people hauler (\$0.59/mile x 900 miles /trip x 4 trips) .	2124
	Electric seine repair and maintenance	400
	Field supplies (net handles, nets, boots, first aid, electrical safety gloves, tools batteries, generator gas)	<u>428</u>
	Total Task 4	28850
Task 5	Biologist-Researcher IV (1340/week-6 wks)	8040
	Biologist-Researcher II (2 x 750/week- 8 wks)	12000
	Research Scientist (2 weeks)	3600
	Travel-Lodging (\$80/night x 3 nights/trip x 1 trip x 2 people)	480
	Travel-Per diem (\$39/day x 3 days/trip x 2 people x 1 trips)	234
	Truck mileage (\$0.32/mile x 500 miles /trip/truck x 1 trucks x 1 trips)	<u>160</u>
	Total Task 5	24514
	Sub-total	193826
	CSU Overhead rate to BOR (15%)	<u>29074</u>
	TOTAL (2008)	222900

Budget Footnotes:

- 1 Mileage rates vary depending on year of truck and size. Mileage totals 900 miles per truck/trip based on 500 miles round trip from Ft Collins to Morgan Gulch field site each sample trip plus 400 miles per truck per trip (50 miles per truck per day for 8 days for shuttles and fish hauling).
- 2 Boat repair includes replacement, repair, and maintenance of parts used, broken, or

damaged such as: throttle, steering, motor, jet sleeves and impellers and electrofishing assemblies.

IX. Budget Summary

FY-2008	\$ 222,900
FY-2009	\$ 241,395

X. Reviewers: Biology Committee

XI. References

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Tracking

Filename = 08-09 125 MYampa-SMB-Pike-sow revised.wpd

Revision dates: 2/28/08 Sow provided to T. Chart. 3/10/08: Kantola corrected years under item IX and amount for FY 08 (\$222,900) to match spreadsheet in item VIII.

Appendix Table 1—Sampling gear that may be used by CSU on the Yampa River.

Electrofishing: boat, bank, backpack, or seine.

Nets: Gill, trammel, dip, hoop, fyke, or trap; cages (i.e. minnow traps) - various lengths and mesh sizes.

S seines: various lengths and meshes.

Angling: with bait, lures or artificial flies.

Sampling devices to collect larvae or young.

All gear may be baited or scented with attractants.

Appendix Table 2—Summary of handling, tagging, and disposition requirements for fish captured by CSU researchers in the Yampa River, 2007.

Species	Tag type	Disposition
Native-Colorado pikeminnow	RFID-PIT	measured, marked, and released at capture site
Native-roundtail chub	RFID-PIT	measured, marked and released at capture site
Native-Other species, bluehead sucker flannelmouth sucker hybrid native suckers mountain whitefish speckled dace mottled sculpin	none	measured and released at capture site
Nonnative-northern pike	Pass 1- Yellow Floy tag ¹ Pass-2 Unique number range Floy tag ² Yellow tags numbered higher than 17,000	Pass-1: All sizes measured, marked and released on first pass Pass-2: All sizes measured, marked and moved to Loudy Simpson ponds, Craig, CO. Northern pike recaptured with Orange Floy tags that indicate escapees from Catamount Reservoir will be euthanized and held as requested by CDOW biologist B. Atkinson.
Nonnative-smallmouth bass	Pass 1- Yellow Floy tag ¹ Pass-2 Unique number range Floy tag ² Yellow tags numbered higher than 17,000	Pass-1: If <100 mm TL then euthanized, if ≥100 mm TL then measured, marked and released ³ Pass-2: If <250 mm TL then euthanized, if ≥250 mm TL then measured, marked and moved to Elkhead Reservoir or Craig Justice Center Ponds ³
Nonnatives: bluegill black crappie green sunfish largemouth bass pumpkinseed yellow perch walleye black bullhead grass carp burbot gizzard shad	none	measure, remove, and euthanize, some black crappie, walleye, and largemouth bass will be provided to other researchers for additional research on SOW project C18/19.

Nonnatives: salmonids (trout) white sucker hybrid nonnative suckers common carp channel catfish	none	measure and release at capture site
Nonnative-Prohibited fish species per Colorado Revised Statutes-see list below.	none	measured, euthanized, and preserved

Footnotes:

1. Smallmouth bass and northern pike will be tagged with traditional yellow Floy tags during the first sample pass when they are released back into the river as marked fish for use in calculating an abundance estimate.
2. Smallmouth bass and northern pike will be tagged with special numbered Floy tags when they are transported for stocking in local reservoirs or ponds to serve as a distinctive tag to monitor possible escapement back to the river. Tags will be removed from recaptured fish prior to tagging with a new tag.
3. On the first sampling pass, we will mark smallmouth bass ≥ 100 mm total length (TL) to be consistent with other studies and to monitor the abundance of potential recruits to next years adult population. On subsequent sampling passes, we will only tag and move smallmouth bass ≥ 250 mm TL because large numbers of smaller fish could harm the fishery of the stocking location.

List of Prohibited Aquatic species per Colorado Revised Statutes, Title 33, Article VII, 12, adopted by the Wildlife Commission on 01/11/07: <http://wildlife.state.co.us/RulesRegs/Regulations/>

1. Bowfins: Amiidae.
2. Carp of the following genera: Aristichthys; Catla; Catlocarpio; Carrassius; Cirrinus; Cyprinus [except as noted. above]; Hypophthalmichthys; Labeo; Mylopharyngodon; and Tor.
3. Catfish, Walking: *Clarias batrachus*.
4. Crayfish, Rusty: *Orconectest rusticus*.
5. Eel, Asian Swamp: *Monopterus albus*.
6. Frog, Green: *Rana clamitans*.
7. Gars: Lepistosteidae -- All species.
8. Gobies: Gobiidae.
9. Mussel, Quagga: *Dreissena bugensis*.
10. Mussel, Zebra: *Dreissena polymorpha*.
11. New Zealand mudsnail: *Potamopyrgus antipodarum*.
12. Perch, White: *Morone americana*.
13. Piranha: Including members of the genera Serrasalmus and Pygocentrus.
14. Rudd: *Scardinius erythrophthalmus*.
15. Ruffe, Eurasian: *Gymnocephalus cernuus*.
16. Snakeheads or murrels: Members of the genera Channa, Parachanna and Ophiocephalus.
17. Sticklebacks: Members of the genera Apeltes, Aulorhynchus, Gasterosteus and Pungitus.
18. Tilapia: All species.
19. Trahira: *Hoplias malabaricus*.
20. Water Fleas, Fish Hook and Spiny: *Cercopagis pengoi*, *Bythotrephes lomgimanus*, and *Daphnia lumholtzii*.