# NEWS RELEASE

**ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY**

**For more information contact:**
**Patrick Gibbons, Media Relations Manager**
**Phone - (602) 207-2215**
**E-mail - gibbons.patrick@ev.state.az.us**
**ADEQ Web - http://www.adeq.state.az.us**

## Fish Consumption Advisory Posted for Upper and Lower Lake Mary

PHOENIX (May 10, 2002) The Arizona Department of Environmental Quality, the Arizona Department of Health Services and the Arizona Game and Fish Department have issued an advisory recommending that consumers limit consumption of fish caught from Upper and Lower Lake Mary, located about 10 miles southeast of Flagstaff.

The advisory recommends that people not eat any walleye fish caught from the lake and that they limit their consumption of other fish to one eight ounce fish fillet per month.

The advisory resulted from the recent discovery of mercury in fish caught from the lake. State officials were quick to point out that this advisory does not limit recreational use of Lake Mary for fishing, bird watching, swimming or other types of recreational uses, nor does it affect the use of the lake as a source of drinking water. Other lakes in the immediate area have been tested are not impacted by this advisory.

While officials continue testing to identify possible sources of the mercury, they say it likely accumulated over time in larger fish, which absorb small amounts of mercury by eating other fish and insects. Walleye, the largest predator fish in the lake, has the highest mercury concentrations among fish sampled.

No mercury has been detected in the lake water.

Officials say they have taken a very conservative approach to assessing the risks associated with eating fish from the lake. Those considered most at risk to possible health effects from exposure to mercury would include babies and unborn children whose mothers consume fish containing mercury during pregnancy or while nursing.

Officials are recommending that people avoid consuming walleye and limit consumption of other fish from Lake Mary to one eight ounce fillet per month. This recommendation provides a margin of safety for the public, including pregnant women and women of child-bearing age. However, those with specific questions about health effects from mercury should contact the Arizona Department of Health Services at (800)367-6412.

Officials have begun a public information advisory campaign in English and Spanish in the Flagstaff area and statewide. They were unable to say at this point how long the advisory would remain in effect.

-30-

# Draft calculation of the State screening concentration for the implementing fish consumption advisory analyses for mercury.

Given the State reference dose for the consumption of mercury in fish tissue of 0.0001 mg/Kg/d, default screening concentrations (in the absence of actual consumption data from the waterbody in consideration) for the implementation of fish consumption advisory analysis for mercury in fish tissue protective of persons consuming (n) fish meals per week or less, would be calculated using the following formulas:

**Subsistence consumption:** For Surface Waters where subsistence consumption (average three fish meals per week from an individual waterbody for periods longer than four months) is probable:

$$SC = \frac{0.0001\ mg/Kg/d * 60\ Kg * 7\ d/wk}{3\ mls/wk * 0.227\ \mathbf{Kg}} = 0.061 mg/Kg$$



**Regular consumption:** For urban lakes, municipal park lakes and other waterbodies classified as "Surface Waters" within municipal boundaries with uncontrolled access:

$$SC = \frac{0.0001\ mg/Kg/d * 60\ Kg * 7\ d/wk}{2\ mls/wk * 0.227\ \mathbf{Kg}} = 0.092\ mg/Kg$$

**Sport fishing consumption:** For Surface Waters outside of municipal boundaries and/or away from residential areas or with limited or controlled access:

$$SC = \frac{0.0001\ mg/Kg/d * 60\ Kg * 7\ d/wk}{1\ mls/wk * 0.227\ \mathbf{Kg}} = 0.118\ mg/Kg$$

Where:

SC =Screening Concentration for the initiation of a fish consumption advisory analysis

0.0001 mg/Kg/d = The IRIS RfD for methylmercury*

60 Kg = Average body weight for women of child bearing age*

7 d/wk = seven days in a week*

(N) mls/wk = number of meals consumed per week (1 mls/wk = 32 g/d, 2 mls/wk = 65 g/d, 3 mls/wk = 97 g/d)

0.227 Kg = weight of filet per fish meal (8 oz.)*

Components of the formula marked with an * are either explained in previous documents or are social constants (example: number of days in the week).

It must be stressed that the consumption classification of any waterbody (subsistence, regular or sport consumption) is based on best professional judgement and is subject to change given the completion of a consumption survey or the gathering of other pertinent data. The State is committed to protecting the most vulnerable portions of the population and where significant uncertainty exists, will err on the side of conservatism.

A limited consumption advisory would be issued for a waterbody once an investigation is completed characterizing: a) the available species in the waterbody likely to be taken by fishing; b) the toxicant concentration in at least two size/age classes of the major game species, and; c) the consumption class. These data will be evaluated jointly by the Arizona Department of Environmental Quality, the Arizona Game and Fish Department and the Arizona Department of Health Services and a joint recommendation made.

## Table 4-3. Monthly Fish Consumption Limits for Noncarcinogenic Health Endpoint - Methylmercury

| Risk-Based Consumption Limit[a] | Noncancer Health Endpoints[b] |
|---|---|
| Fish Meals/Month | Fish Tissue Concentrations (*ppm, wet weight*) |
| 16 | >0.03 - 0.06 |
| 12 | >0.06 - 0.08 |
| 8 | >0.08 - 0.12 |
| 4 | >0.12 - 0.24 |
| 3 | >0.24 - 0.32 |
| 2 | >0.32 - 0.48 |
| 1 | >0.48 - 0.97 |
| 0.5 | >0.97 - 1.9 |
| None (<0.5) | >1.9 |

[a] The assumed meal size is 8 oz (0.227 kg). The ranges of chemical concentrations presented are conservative, e.g., the 12-meal-per-month levels represent the concentrations associated with 12 to 15.9 meals.

[b] Chronic, systemic effects.

Notes:

1. Consumption limits are based on an adult body weight of 72 kg and an RfD of $1x10^{-4}$ mg/kg-d.
2. None = No consumption recommended.
3. In cases where >16 meals per month are consumed, refer to Equations 3-1 and 3-2, Section 3.2.1.2, for methods to determine safe consumption limits.
4. The detection limit for methylmercury is 1.3 ppb.
5. Instructions for modifying the variables in this table are found in Section 3.3.
6. Monthly limits are based on the total dose allowable over a 1-month period (based on the RfD). When the monthly limit is consumed in less than 1 month (e.g., in a few large meals), the daily dose may exceed the RfD (see Section 2.3).

# Research Websites

**General Websites**

Enviromentors
http://www.environmentors.org/AdvancedLinks.htm
EPA
http://www.epa.gov/
ADEQ
http://www.adeq.state.az.us/index.html
Arizona Game and Fish Department
http://www.gf.state.az.us/
Arizona Water Quality Standards
http://www.sosaz.com/public_services/Title_18/18-11.htm

**Physical Integrity**

Watershed Analysis Guide
http://www.epa.gov/owow/watershed/wacademy/wam/channel.html
Wildland Hydrology
http://www.wildlandhydrology.com/
Intro to Fluvial Geomorphology
http://www.usra.edu/esse/ford/ESS205/fluvial/fluvial.html
Virtual Geomorphology
http://main.amu.edu.pl/~sgp/gw/gw.htm
American Water Resources Association
http://www.awra.org/jawra/keywords/key609.htm
"Volunteer Monitor" article on Fluvial Geomorphology
http://www.epa.gov/volunteer/fall96/wwmoni13.html
Real Time Arizona Stream Flow Data
http://az.waterdata.usgs.gov/nwis/current?type=flow
Interagency sedimentation conference
http://water.usgs.gov/wicp/proceedings.html

**Toxicants in Fish Tissue**

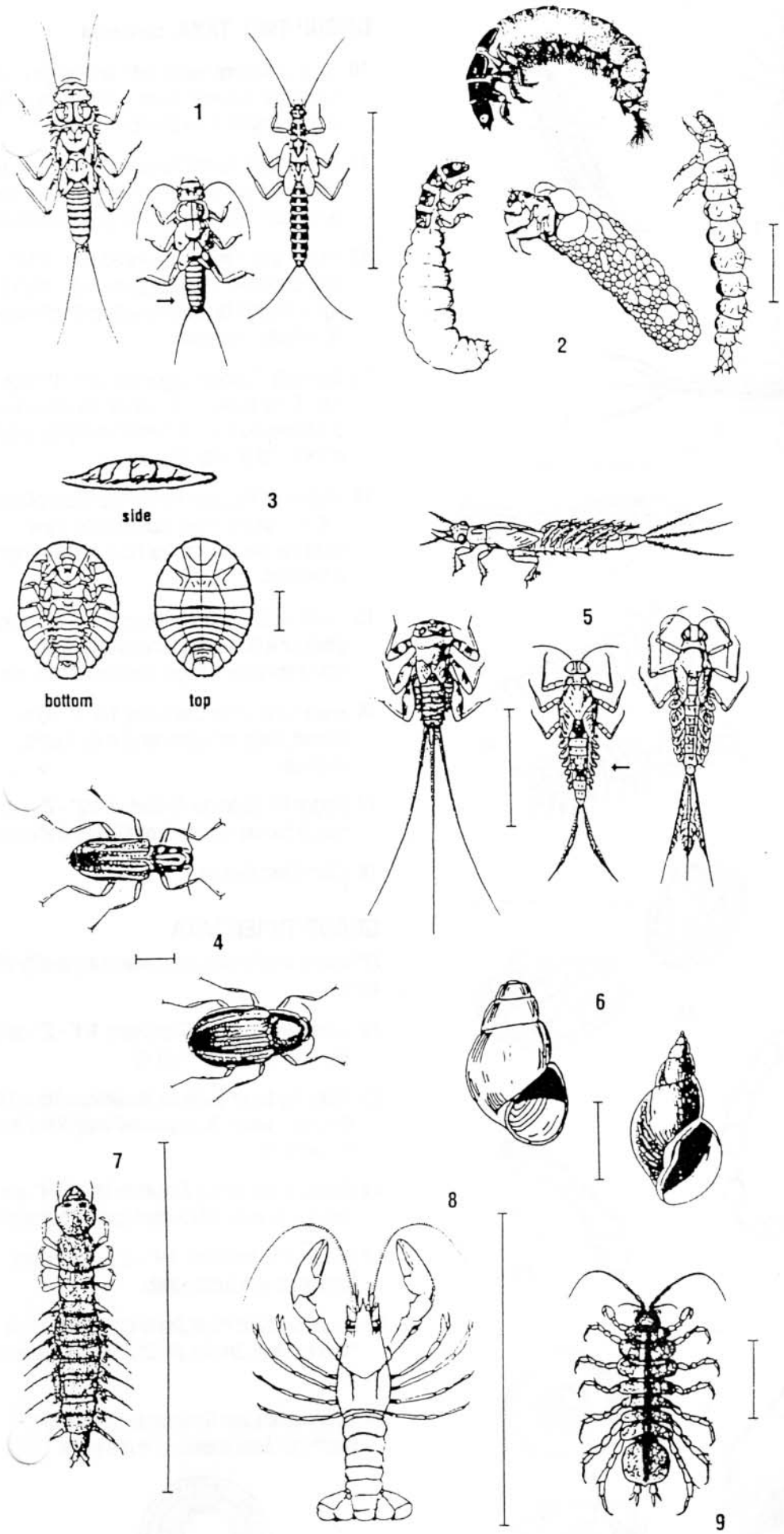
ATSDR
http://www.atsdr.cdc.gov/atsdrhome.html
CDC
http://www.cdc.gov/
EPA's IRIS database
http://www.epa.gov/iriswebp/iris/index.html
EXTOXnet database
http://ace.ace.orst.edu/info/extoxnet/

National Library of Medicine TOXNET
http://toxnet.nlm.nih.gov/
Environmental Fate Database
http://esc.syrres.com/efdb.htm
USGS Toxic Substances Hydrology Program
http://toxics.usgs.gov/
USGS NAWQA Pesticide Program
http://water.wr.usgs.gov/pnsp/
EPA list of banned pesticides
http://www.epa.gov/oppfead1/international/us-unlist.htm
EPA list of Persistent Bioaccumulative Toxicants
http://www.epa.gov/opptintr/pbt/cheminfo.htm
American Fisheries Society
http://www.fisheries.org/
EPA Fish and Wildlife Consumption Advisories
http://www.epa.gov/OST/fish/
"Fishbase" Fish Database
http://www.fishbase.org/search.cfm
Canadian Journal of Fisheries and Aquatic Sciences
http://www.nrc.ca/cgi-bin/cisti/journals/rp/rp2_vols_e?cjfas
National Library of Medicine Publication Database
http://www.ncbi.nlm.nih.gov/entrez/query.fcgi

**Macroinvertebrate Biocriteria**

North American Benthological Society
http://www.benthos.org/
Journal of the North American Benthological Society
www.benthos.org/jnabs/
Digital Dragonflies
http://www.dragonflies.org/
Bioindicators in Wetlands
http://www.epa.gov/owow/wetlands/wqual/ppaindex.html
Oregon Protocols
http://www.salmonweb.org/salmonweb/oregon/Macro.html
USEPA biocriteria webpage with links to the Rapid Bioassessment Protocols Manual)
http://www.epa.gov/ost/biocriteria/index.html
Aquatic Biology Associates, Inc. - ADEQ's Lab info and protocols
www.aquaticbio.com
Insect drawings at University of Illinois
www.life.uiuc.edu/Entomology/
Macroinvertebrate key
http://users.net1plus.com/tdriskell/macroinvertebrates.html

USEPA bioindicators webpage
http://www.epa.gov/bioindicators/
Integrated taxonomic information system
www.itis.usda.gov/
New York state Key to macroinvertebrates
www.dec.state.ny.us/website/dow/stream/




Bar lines indicate relative size

# Stream Insects & Crustaceans

## GROUP ONE TAXA

*Pollution sensitive organisms found in good quality water.*

1 *Stonefly: Order Plecoptera.* 1/2" - 1 1/2", 6 legs with hooked tips, antennae, 2 hair-like tails. Smooth (no gills) on lower half of body. (See arrow.)

2 *Caddisfly: Order Trichoptera.* Up to 1", 6 hooked legs on upper third of body, 2 hooks at back end. May be in a stick, rock or leaf case with its head sticking out. May have fluffy gill tufts on lower half.

3 *Water Penny: Order Coleoptera.* 1/4", flat saucer-shaped body with a raised bump on one side and 6 tiny legs on the other side. Immature beetle.

4 *Riffle Beetle: Order Coleoptera.* 1/4", oval body covered with tiny hairs, 6 legs, antennae. Walks slowly underwater. Does not swim on surface.

5 *Mayfly: Order Ephemeroptera.* 1/4" - 1", brown moving, plate-like or feathery gills on sides of lower body (see arrow), 6 large hooked legs, antennae, 2 or 3 long, hair-like tails. Tails may be webbed together.

6 *Gilled Snail: Class Gastropoda.* Shell opening covered by thin plate called operculum. Shell usually opens on right.

7 *Dobsonfly (Hellgrammite): Family Corydalidae.* 3/4" - 4", dark-colored, 6 legs, large pinching jaws, eight pairs feelers on lower half of body with paired cotton-like gill tufts along underside, short antennae, 2 tails and 2 pairs of hooks at back end.

## GROUP TWO TAXA

*Somewhat pollution tolerant organisms can be in good or fair quality water.*

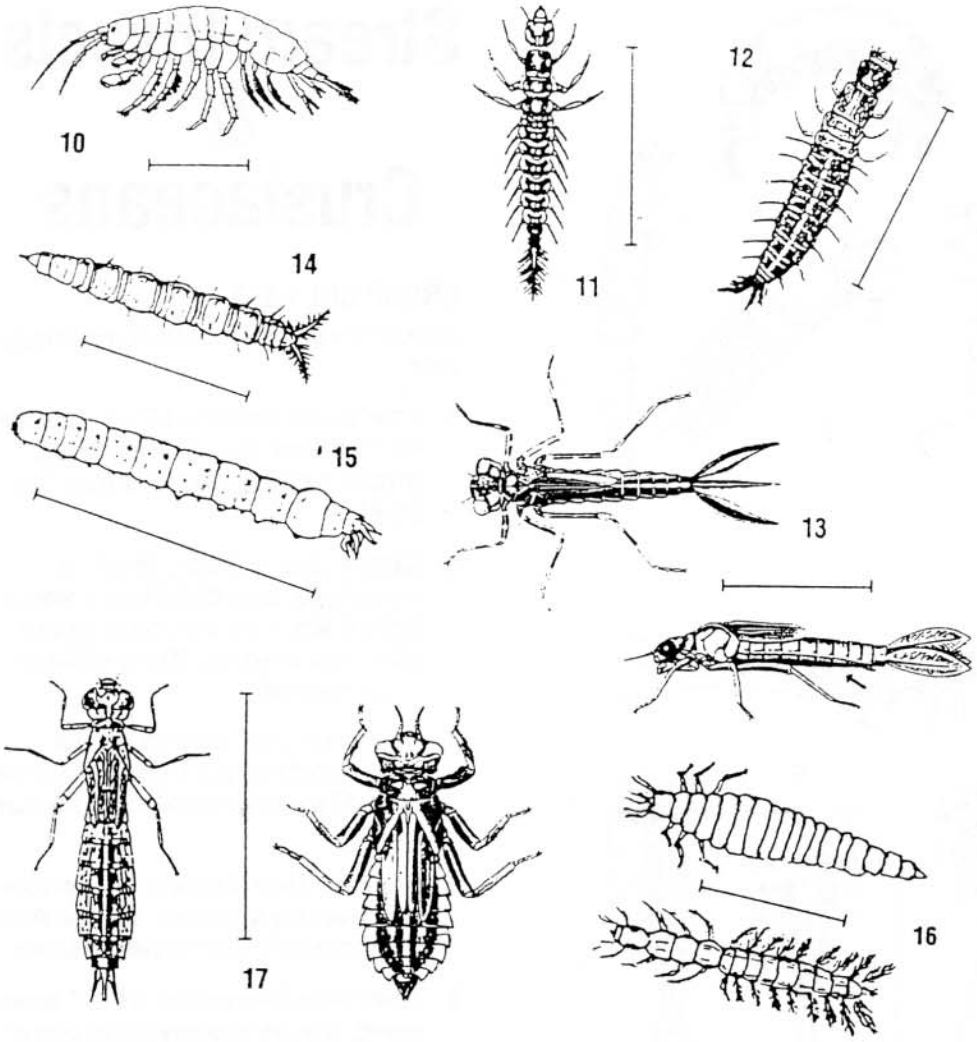
8 *Crayfish: Order Decapoda.* Up to 6", 2 large claws, 8 legs, resembles small lobster.

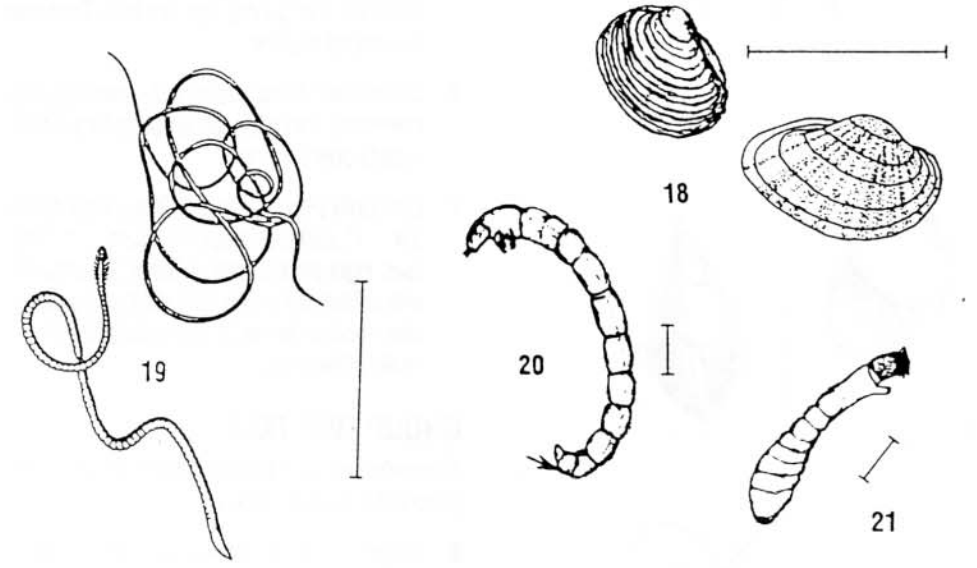
9 *Sowbug: Order Isopoda.* 1/4" - 3/4", gray oblong body wider than it is high, more than 6 legs, long antennae.

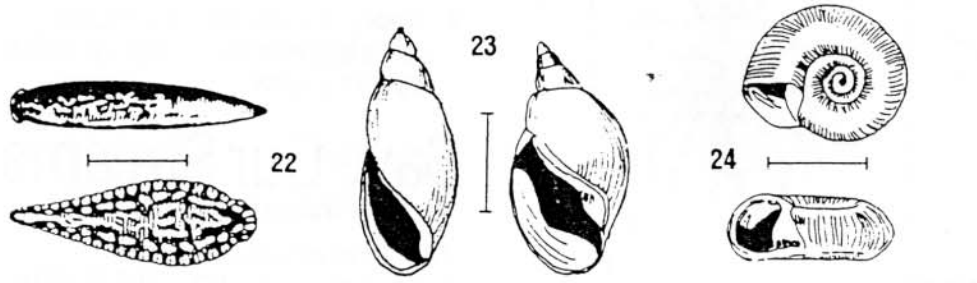

## Save Our Streams

**Izaak Walton League of America**

707 Conservation Lane
Gaithersburg, MD 20878-2983
(301)548-0150




Bar lines indicate relative size

## GROUP TWO TAXA continued

**10** *Scud: Order Amphipoda.* 1/4", white to grey, bo higher than it is wide, swims sideways, more tha legs, resembles small shrimp.

**11** *Alderfly larva: Family Sialidae.* 1" long. Looks lik small hellgrammite but has 1 long, thin, branche tail at back end (no hooks). No gill tufts underne

**12** *Fishfly larva: Family Corydalidae.* Up to 1 1/2" long. Looks like small hellgrammite but often a lighter reddish-tan color, or with yellowish strea No gill tufts underneath.

**13** *Damselfly: Suborder Zygoptera.* 1/2" - 1", large eyes, 6 thin hooked legs, 3 broad oar-shaped tai positioned like a tripod. Smooth (no gills) on sic of lower half of body. (See arrow.)

**14** *Watersnipe Fly Larva: Family Athericidae (Atheri* 1/4" - 1", pale to green, tapered body, many caterpillar-like legs, conical head, feathery "horn at back end.

**15** *Crane Fly: Suborder Nematocera.* 1/3" -2", milky green, or light brown, plump caterpillar-like segmented body, 4 finger-like lobes at back end.

**16** *Beetle Larva: Order Coleoptera.* 1/4" 1", light-colored, 6 legs on upper half of body, feelers, antennae.

**17** *Dragon Fly: Suborder Anisoptera.* 1/2" - 2", large eyes, 6 hooked legs. Wide oval to round abdome

**18** *Clam: Class Bivalvia.*

## GROUP THREE TAXA

*Pollution tolerant organisms can be in any quality o water.*

**19** *Aquatic Worm: Class Oligochaeta.* 1/4" - 2", can very tiny; thin worm- like body.

**20** *Midge Fly Larva: Suborder Nematocera.* Up to 1/ dark head, worm-like segmented body, 2 tiny leg on each side.

**21** *Blackfly Larva: Family Simulidae.* Up to 1/4", one end of body wider. Black head, suction pad on en

**22** *Leech: Order Hirudinea.* 1/4" - 2", brown, slimy body, ends with suction pads.

**23** *Pouch Snail and Pond Snails: Class Gastropoda.* No operculum. Breathe air. Shell usually opens o left.

**24** *Other snails: Class Gastropoda.* No operculum Breathe air. Snail shell coils in one plane.

# APPLIED RIVER MORPHOLOGY

DAVE ROSGEN
*Wildland Hydrology*
*Pagosa Springs, Colorado*

Illustrations
HILTON LEE SILVEY
*Western Hydrology*
*Lakewood, Colorado*

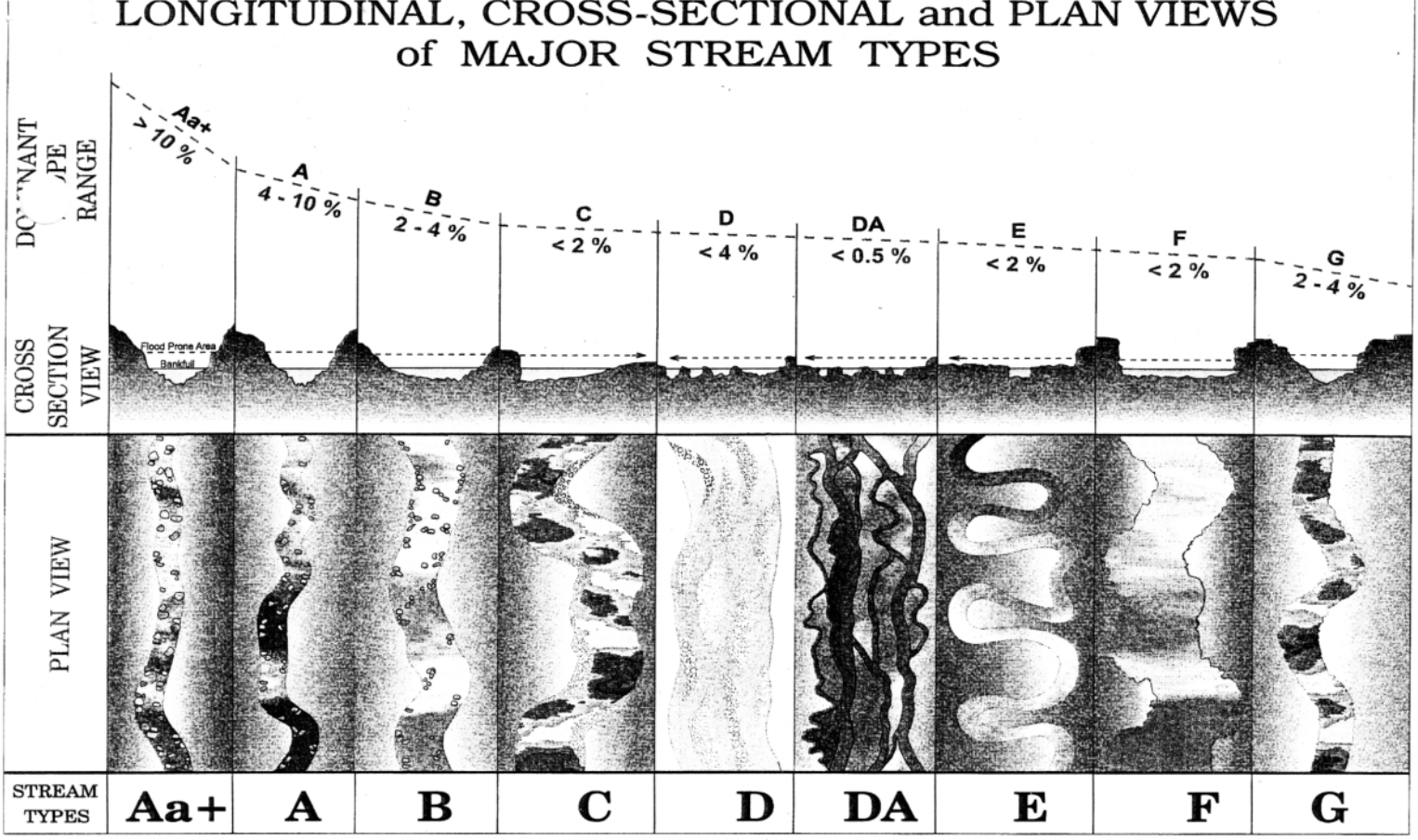



FIGURE 2. Broad level stream classification delineation showing longitudinal, cross-sectional and plan views of major stream types. (from Rosgen, 1994)

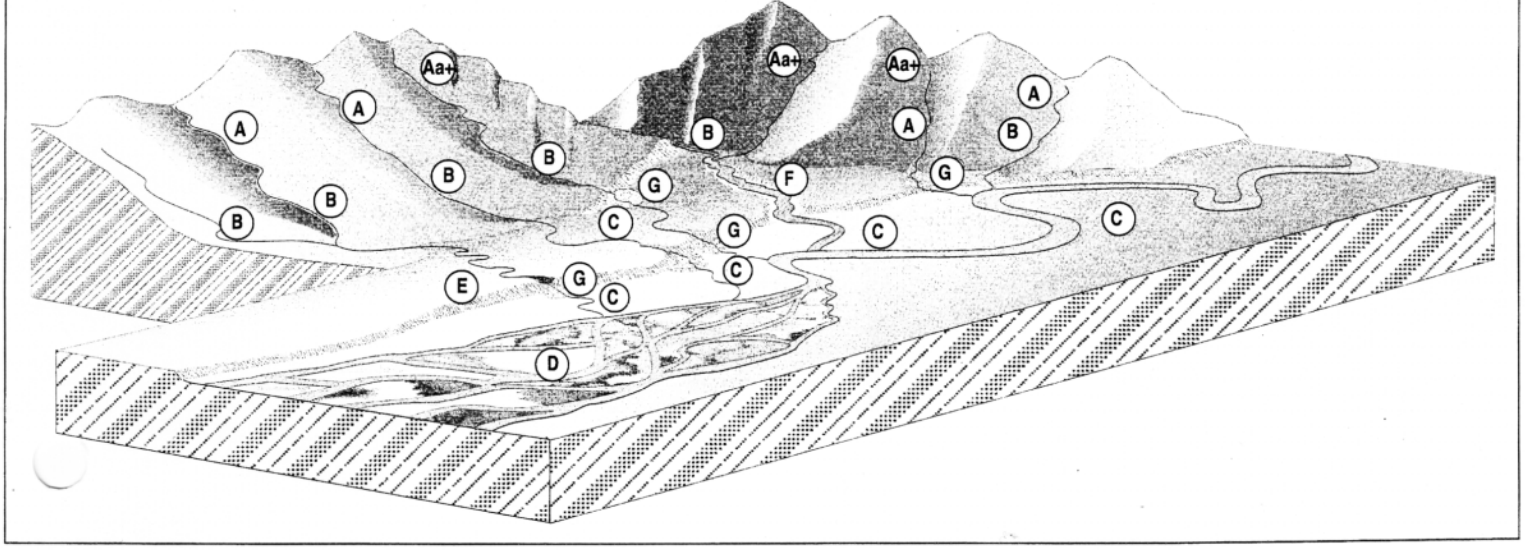
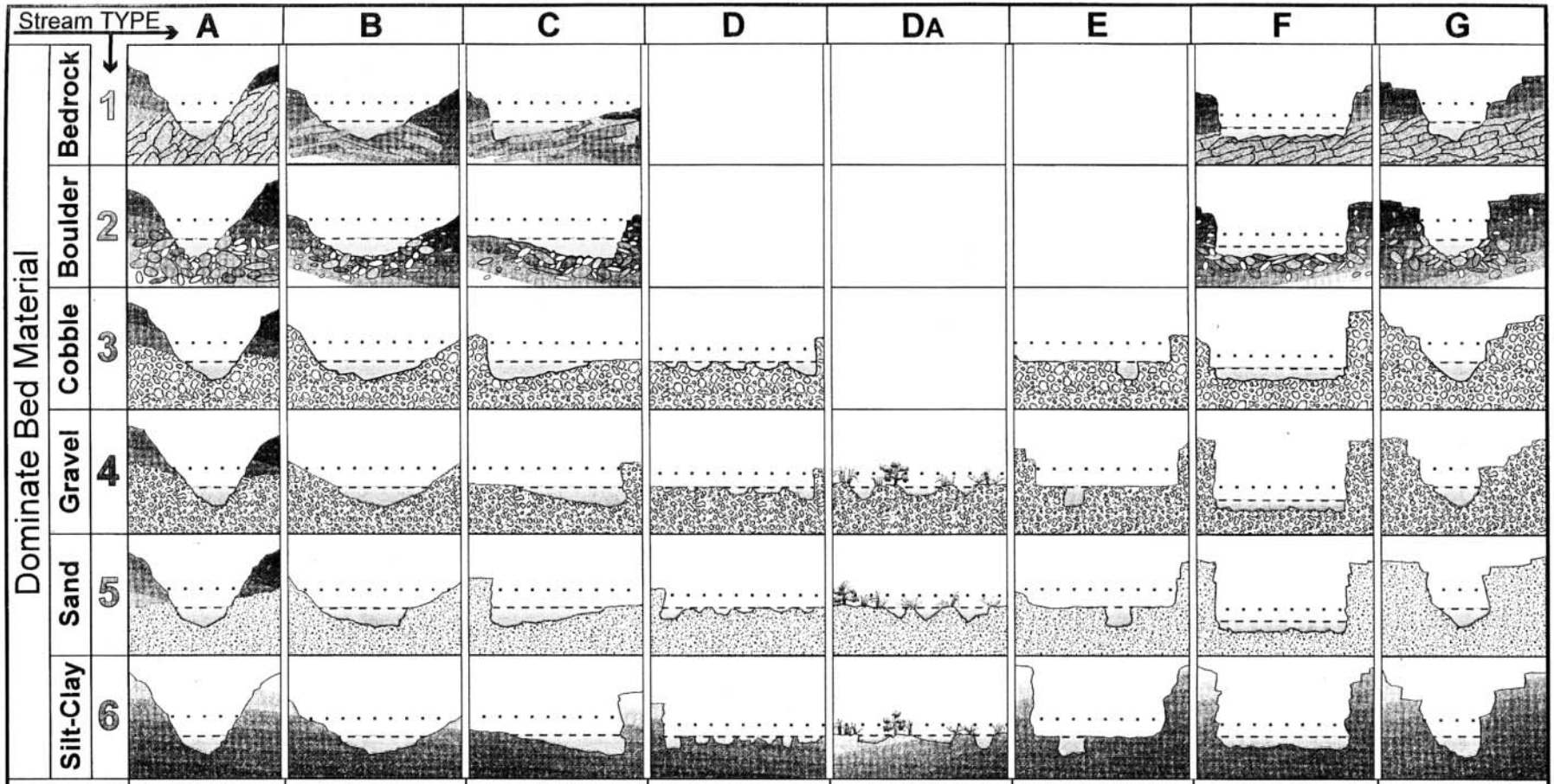


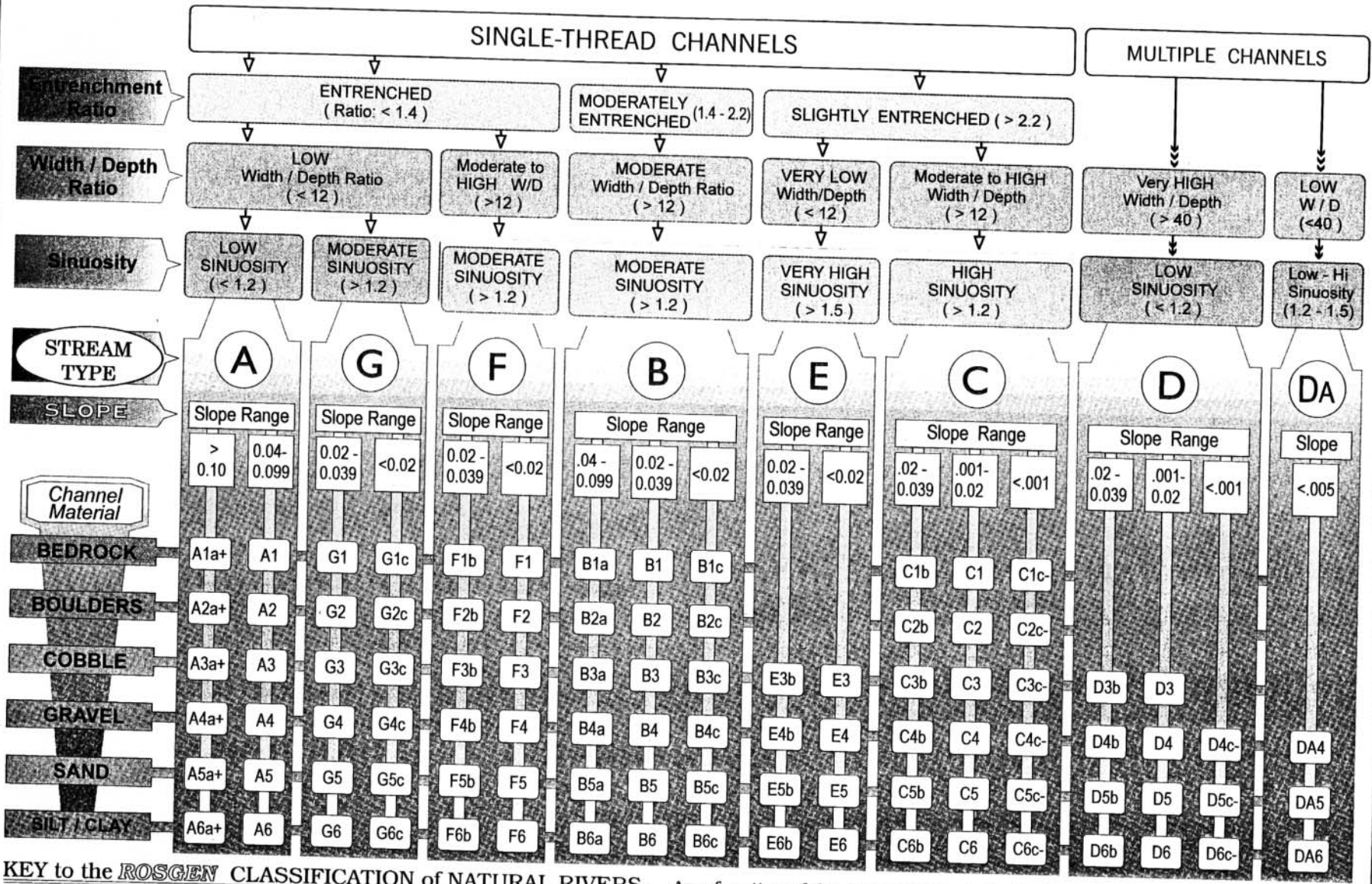

FIGURE 3. Example of broad level delineation of stream types at Level I.

FIELD GUIDE FOR STREAM CLASSIFICATION




| Stream TYPE | A | B | C | D | DA | E | F | G |
|---|---|---|---|---|---|---|---|---|
| Entrchmnt. | < 1.4 | 1.4 - 2.2 | > 2.2 | n/a | > 4.0 | > 2.2 | < 1.4 | < 1.4 |
| W/D Ratio | < 12 | > 12 | > 12 | > 40 | < 40 | < 12 | > 12 | < 12 |
| Sinuosity | 1 - 1.2 | > 1.2 | > 1.2 | n/a | variable | >1.5 | > 1.2 | >1.2 |
| Slope | .04-.099 | .02-.039 | < .02 | < .04 | < .005 | < .02 | < .02 | .02-.039 |

FIGURE 5-2. Primary delineative criteria for the major stream types.




KEY to the *ROSGEN* CLASSIFICATION of NATURAL RIVERS. As a function of the "*continuum of physical variables*" within stream reaches, values of ***Entrenchment*** and ***Sinuosity*** ratios can vary by +/- 0.2 units; while values for ***Width / Depth*** ratios can vary by +/- 2.0 units.

FIGURE 5-3. Classification key for natural rivers.