

Water 101

Guadalupe – San Antonio BBASC

June 2, 2010

Common Units of Measurement (Water Quantity)

- ❑ **cubic feet per second (cfs)** – A rate of flow typically used in measuring streamflow, to illustrate how a volume of water (a cubic foot) moves past a point over a period of time (seconds).

- ❑ **acre-feet (acft)** – A volume of water typically used in describing the storage in a reservoir. It is the equivalent to a 1 foot depth of water spread over an acre.
 - **acft/mo or acft/yr** – A volume of water used or delivered over an entire month or year. These units are used for large volumes of water, typically used when describing water rights diversion amounts or amount of water right used within a given year.

Common Units of Measurement (Water Quantity) (cont.)

- ❑ **Million Gallons per Day (MGD)** – A volume of water used or delivered over a day. This unit is used for large volumes of water, typically used when describing treated water amounts (both in water treatment plants and wastewater treatment plants).

- ❑ **Gallons Per Minute (GPM)** – A rate of water used or delivered within a minute's time. This unit is used for large volumes of water, typically used when describing treated water rates (both in water treatment plants and wastewater treatment plants).

Unit Conversions (Water Quantity)

To

	cfs	acft/yr	MGD	GPM
cfs		723.97	0.646	448.8
acft/yr	0.00138		0.000893	0.6199
MGD	1.547	1,120.3		694.44
GPM	0.00223	1.613	0.00144	

Common Units of Measurement (Water Quality)

- ❑ How much salt and other solids that are dissolved in water is commonly expressed in units of salinity or total dissolved solids. These units all measure the concentration of solids in water.
- ❑ Units of salinity are typically expressed as parts per thousand (PPT) where a salinity of 1 means there is 1 part of dissolved solids for each 1,000 parts of water.
- ❑ Units of total dissolved solids are typically expressed as parts per million (PPM) or milligrams per liter (mg/L). These units mean the same thing where 1 PPM has the same concentration of solids as 1 mg/L.
 - *Drinking water standard is 500 mg/L (0.5 PPT or 500 PPM)*
 - *Estuarine salinity is typically between 5 and 30 PPT (5,000 and 30,000 PPM or 5,000 and 30,000 mg/L)*
 - *Seawater salinity is typically ~35 PPT (~35,000 PPM or ~35,000 mg/L)*

Junior / Senior Water Rights

- ❑ **The terms “Junior” and “Senior” are relative terms, and qualitatively assess the ranking of water rights under the law of prior appropriation.**
- ❑ **Based on a water right’s priority date with the Prior Appropriation Doctrine - “First in Right, First in Time”**
- ❑ **The terms can be used in discussing an individual water right, when describing it’s relation to another water right.**
 - **For example, a water right with a 1952 priority date is senior to a water right with a 1984 priority date.**

Junior / Senior Water Rights (cont.)

□ **The terms can also be used to describe a group of water rights as they relate to a significant change.**

For example:

- **Development of a major reservoir: a group of water rights are “junior” to the reservoir, meaning their relative priority is junior (lower) to the reservoir.**
- **Appropriation Doctrine: there are water rights (“Senior”) that existed prior to the Appropriation process (early-1980s) and those (“Junior”) that have been permitted since the Appropriation process.**
- **The addition of instream flow restrictions on water rights: “Senior” water rights typically do not have instream flow provisions. “Junior” water rights typically do have instream flow provisions.**

Discharges to Streams

- ❑ **Effluent** – Treated or untreated wastewater that flows out of a wastewater treatment plant or industrial outfall, prior to entering a water body.
- ❑ **Return Flow** – That portion of state water (surface water) diverted from a water source and beneficially used which is not consumed as a consequence of that use and returns to a watercourse. Return flow includes sewage effluent.

Direct & Indirect Reuse

- **Direct Reuse** – The delivery of treated wastewater from a wastewater treatment plant to place of use via pipeline
 - Sometimes called “flange-to-flange”
 - Typically used for irrigation, industrial processes, and cooling

- **Indirect Reuse** – The discharge of treated wastewater into a river, stream, or lake for subsequent diversion downstream
 - Sometimes called “Bed and Banks transfer”

Flow Definitions

□ Instream Flow

- **An instream flow is an amount of water running in a river, usually measured by the volume moving down the channel in a specified amount of time (discharge). A variety of instream flows are required to maintain a healthy river.**

□ Environmental Flow

- **The amount of streamflow needed in a river (stream) or inflow into an estuary to maintain acceptable conditions that support aquatic life and other species.**

Flow Definitions (cont.)

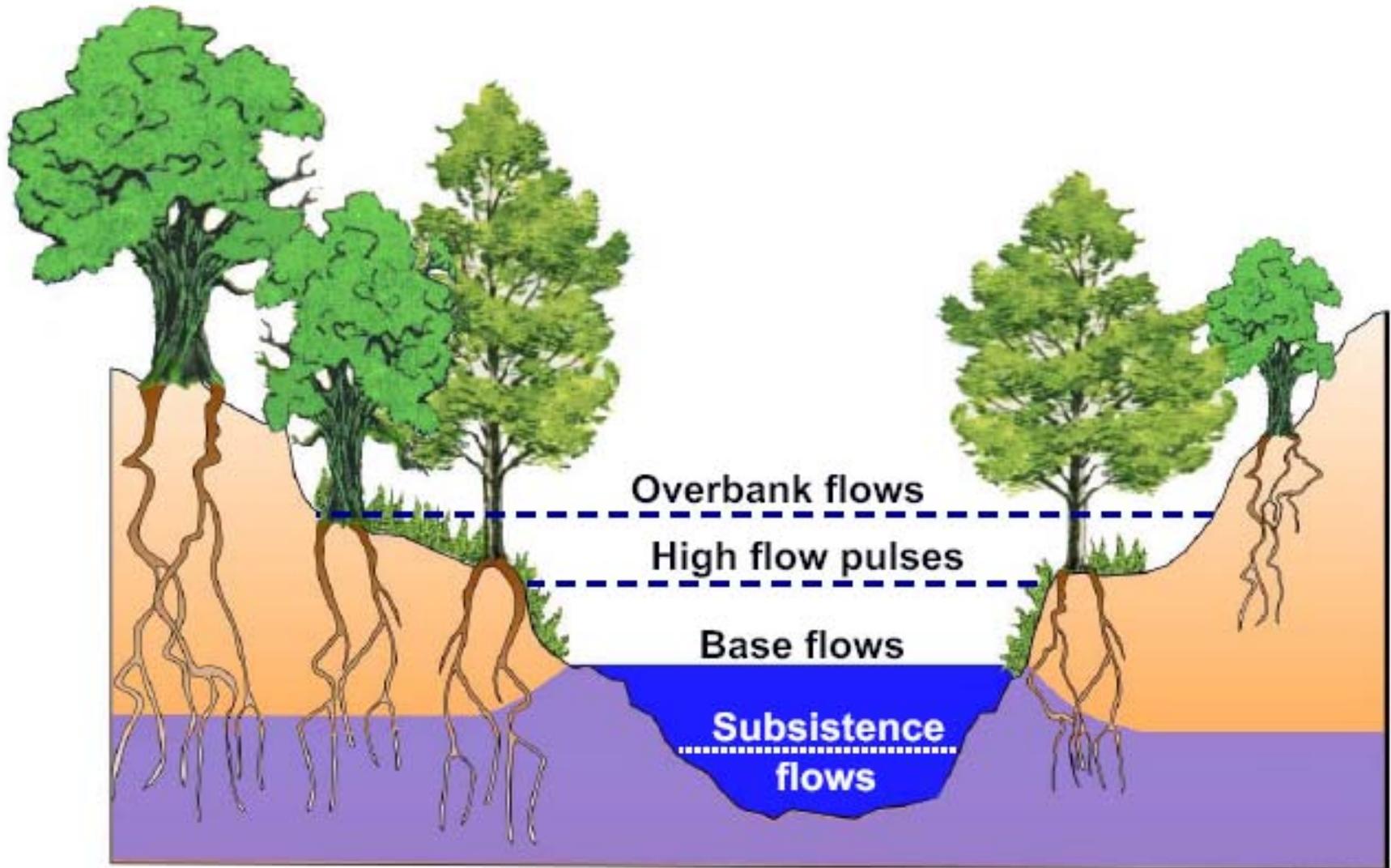
□ Freshwater Inflow

- **The amount of fresh flow needed to maintain acceptable conditions in the estuarine areas that support marine life and other species. Freshwater inflows help control salinity levels and supply critical nutrients and sediments.**

□ Beneficial Inflow

- **Freshwater inflow providing for a salinity, nutrient, and sediment loading regime adequate to maintain an ecologically sound environment in the receiving bay and estuary that is necessary for the maintenance of productivity of economically important and ecologically characteristic sport or commercial fish and shellfish species and estuarine life upon which such fish and shellfish are dependent.**

Environmental Flow Regime



Flow Regime Terms

□ Subsistence Flow

- **The minimum stream flow needed during critical drought periods to maintain tolerable water-quality conditions and to provide minimal aquatic habitat space for the survival of aquatic organisms.**

□ Baseflow or 'normal flow'

- **The portion of streamflow uninfluenced by recent rainfall or flood runoff and is comprised of springflow, seepage, discharge from artesian wells or other groundwater sources, and the delayed drainage of large lakes and swamps. (Accountable effluent discharges from municipal, industrial, agricultural, or other uses of ground or surface waters may be included at times.)**

Flow Regime Terms (cont.)

High Flow Pulses

- **Short-duration flows confined to the stream channel and occur during or immediately after storms. High-flow pulses flush fine-sediment deposits and waste products from the system, restore normal water quality following prolonged low flows**

Overbank Flow

- **An infrequent, high-flow event that breaches riverbanks. Overbank flows may restructure the channel and floodplain, recharge groundwater tables, deliver nutrients to riparian vegetation and connect the channel to floodplain habitats that provide additional food and space for aquatic organisms.**

Environmental Flow Regime

Table 10-1. Definitions and objectives for instream flow components.

Subsistence flows

Definition: Infrequent, seasonal periods of low flow

Objectives: Maintain water quality criteria

Base flows

Definition: Normal flow conditions between storm events

Objectives: Ensure adequate habitat conditions, including variability, to support the natural biological community

High flow pulses

Definition: Short-duration, in-channel, high flow events following storm events

Objectives: Maintain important physical habitat features
Provide longitudinal connectivity along the river channel

Overbank flows

Definition: Infrequent, high flow events that exceed the normal channel

Objectives: Maintain riparian areas
Provide lateral connectivity between the river channel and active floodplain

Additional Terms of Interest

- ❑ **Riparian** – Of, pertaining to, or situated or dwelling on the bank of a river or other water body. Generally includes the area of the stream and out onto the flood plain which is periodically inundated by the flood water from the stream.
- ❑ **Riparian Zone** – The vegetated corridor along streams and rivers.
- ❑ **River Channel** – The clearly defined path a stream flows down. This path is defined by a bed and banks.
- ❑ **Floodplain** – The land areas adjacent to rivers and streams that are subject to recurring inundation.
- ❑ **Dissolved Oxygen (DO)** – The amount of oxygen molecules dissolved in a water body. The amount of dissolved oxygen determines which aquatic organisms will be favored, and will also determine the rate and direction of many chemical reactions.

Questions / Comments