

APPENDIX K
WATER MANAGEMENT PLANNING
GLOSSARY OF TERMS

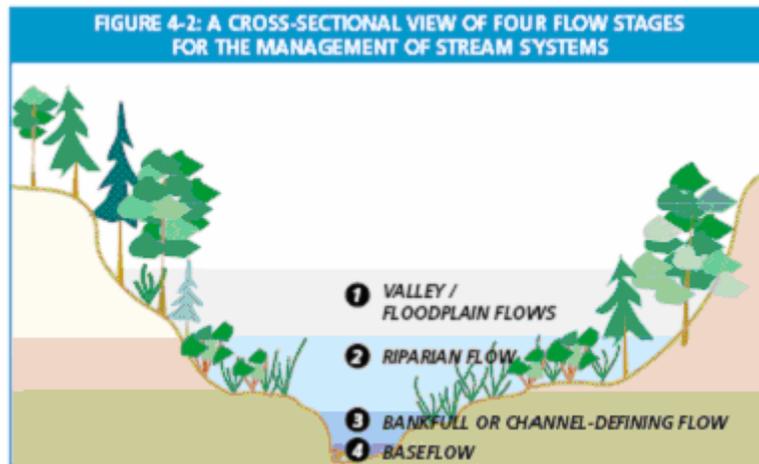
Water Management Planning Glossary of Terms

Hydrologic Definitions:

- **BASE FLOW** – is that portion of stream flow originating in indirect runoff, that is, runoff that has reached the stream or river by first passing through the underlying aquifer, rather than by flowing directly overland as surface flow. Baseflow effectively drains the neighbouring shallow ground water reservoirs, eventually leading to their depletion in the absence of substantial recharge. This is almost always cool or cold water and does not vary much in quantity or temperature at a particular location throughout the year. Baseflow is characteristically a very slow process, with strong runoff diffusion and very little variability. The presence of baseflow throughout the year is an indication of a humid climate and a shallow ground water table with fast recharge potential.
- **BANKFULL STAGE** - An established river stage at a certain point along a river which is intended to represent the maximum safe water level which will not overflow the river banks or cause any significant damage within the reach of the river
- **BANK-FULL FLOW/DISCHARGE** – is considered to be the flow that is attained in a river that brings the water to the point where it is about to top over its banks. It determines channel characteristics (morphology) of width, depth, sediment size & sorting, and channel plan form. In most streams and rivers in Northern Ontario, the bank-full flow would be the flow representing a runoff event with a return period of something like once every two years.
- **DAILY AVERAGE MINIMUM FLOW** – The minimum flow attained on average over the course of a 24 hour time period.
- **DRAINAGE BASIN** - The area enclosed by a topographic divide such that surface runoff drains by gravity into a river, lake or other water body.
- **FLOW DURATION CURVE** – a plot of flow vs. % time exceedence for a specific location. % time exceedence is a percent of time that a specific flow is equaled or exceeded.
- **FLOW REGIME** – a range of flows associated with a river or stream that outlines the flow levels or conditions in a watercourse.
- **FLUSHING FLOWS** – channel maintenance/flushing floods are analogous to bankfull flows, the stage at which water just begins to overflow onto the flood plain and corresponding to the discharge at which channel maintenance is most effective. Flows that exceed the entrainment velocity of sediment and cause sediment bedload transport. Channel maintenance/flushing floods” control natural channel structure and can be further divided into valley/flood plain flows and riparian flows.
- **FRESHET** – the increased flow attributed to precipitation, melting snow and ice during the spring season.
- **HEADWATER** – The section of a river or stream with the highest elevation above seawater. This is the area in a watershed that most streams begin and flow down to areas of lower elevation.
- **HIGH FLOWS** –High flows represent flood events. Flood events provide flushing flows. Flood events also provide exposure to floodplains, a vital part of nutrient cycling and habitat maintenance. This is true for small to medium size floods with a return period of less than 1 to 5 years, larger floods can result in structural damage of bank erosion and total bed movement, from which habitats and biota take longer to recover from. There are three major types of high flows: Valley /Floodplain Flows, Riparian Flows, Bankfull Flows.

High flow variables include:

- | | | |
|--|---|---|
| -Bankfull $Q_1 - Q_{1.5}$ | The maximum flow attained from 1-1.5 years | |
| -Riparian or floodplain $Q_2 - Q_{20}$ | The maximum flow attained from 2-20 years | - |
| Valley $Q_{25} - Q_{100}$ | The maximum flow attained from 25-100 years | |



- **DAILY FLOW HYDROGRAPH** – a plot of flow vs. date for a specific location over a given period of time.
- **HYDROMETRIC** - pertaining to the measurement of hydraulic parameters of water bodies, which may be flowing above or below ground, or quasistatic in lakes, reservoirs and underground formations.
- **INSTANTANEOUS FLOW** – Water, which at any instant, is flowing into the channel system from surface flow, subsurface flow, base flow, and rainfall that has directly fallen onto the channel. Minimum instantaneous flow is the minimum flow attained in an instant in time. Maximum instantaneous flow is the maximum flow attained in an instant in time.
- **LOW FLOWS** – is the dry season stream flow which, in the absence of rain and or snowmelt is sustained through groundwater discharge.

Extreme Low flow variables include:

- Habitat Maintenance Flow $7Q_2$
- Local Extinction Flow $7Q_{10}$
- Systems Extinction Flow $7Q_{20}$

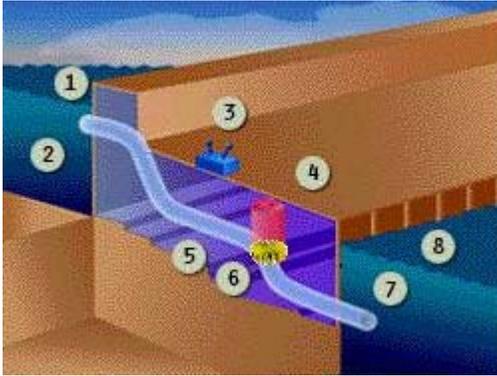
Habitat maintenance flow is the seven (consecutive) day average low flow that occurs on average every two years. It represents a period of stress on the system that can cause some reduction of populations, and thus loss of some productive and reproductive capacity. Local extinction flow is the seven day average low flow that occurs on average every ten years. It represents a major period of stress on the system and in many cases will cause local extinction's, especially in small systems. Systems extinction flow is the seven day average low flow that occurs on average every 20 years. It represents significant stress on the system and in many cases will result in extirpation of fish communities throughout many sections of the stream system.

- **MEAN ANNUAL FLOOD** - the flow representing a runoff event having a probability of occurrence once every 2.33 years. This would usually occur during the spring freshet in our snow-melt dominated basins here in NE Region, but may be equaled or exceeded in a severe summer rainfall event.

- **MINIMUM FLOW** – the lowest flow on record in a flow data set.
- **MINIMUM CONTINUOUS FLOW**- a minimum flow set as a threshold that the flow is not to go below and is maintained on a continuous basis, established below a hydro facility.
- **PERCENT EXCEEDENCE (80% & 20%)** – on a flow duration curve the percent of time that a specific flow is equaled or exceeded. The 80% & 20% exceedence is the flow that is equaled or exceeded 80% or 20% of the time.
- **RIPARIAN FLOW** – these are overbank flows that result in significant interaction between the channel and the floodplain, defined as events with a frequency between 1:2 year and 1:20 year return period (MNR, 1994) or covering the equivalent of the “confinement area”. The high flows that access the floodplain on a fairly regular basis are described as “riparian flows,” since these discharges form and sustain the complex environment adjacent to and overlapping with the channel. From a physical perspective, these frequent high flows must be able to reach the floodplain in order to dissipate energy and deposit sediment. The boundaries can be partially defined through measuring the entrenchment at a cross-section. From an ecological perspective, these flows link the stream corridor with the channel. This process enables fish to spawn on the floodplain. Nutrients and moisture are also delivered to the vegetation communities. Further, these flows help to form and sustain the phreatic zone which includes shallow groundwater and benthic species. These functions partially illustrate how complex the riparian zone is and how essential these flows are.
- **RIPARIAN VEGETATION** – non-aquatic vegetation that directly influences the stream. Its influence on the stream is inversely proportional to the stream size with first to fourth order stream tending to be strongly controlled by riparian vegetation.
- **REACH** - the distance between two specific points outlining that portion of the stream, or river for which the forecast applies. This generally applies to the distance above and below the forecast point for which the forecast is valid. Generally, a reach is a contiguous section of river where channel form is consistent i.e. a run between two waterfalls.
- **STAGE-DISCHARGE** – The discharge of a facility associated with the specific water level or stage of the headpond or reservoir.
- **STREAMFLOW** - The quantity of water flowing past a point on a river in a unit of time. Common units are litres/second or cubic metres per second. "Streamflow" is often used interchangeably with "discharge".
- **WATERSHED** - same as drainage basin.
- **WETTED PERIMETER** – The area of habitat that is inundated with water. Can apply to both lacustrine and riverine environments.

Hydroelectric Power Generation Glossary

- **ABSOLUTE MAXIMUM LEVEL** - the maximum safe water level at a dam with respect to dam safety. When the water level reaches this point, the Emergency Preparedness Plan provisions for a severe flood are implemented. The IDF may in some cases represent the absolute maximum level, but not necessarily.
- **HYDROELECTRIC FACILITY** –



1. Forebay
2. Intake
3. Transformer
4. Generator
5. Penstock
6. Turbine
7. Draft tube
8. Tailrace

- **FLOOD ALLOWANCE** – the maximum allowable flood level for a reservoir as outlined in its license of occupation for that particular facility.
- **FLOOD STORAGE LEVEL**- the maximum level at which a reservoir can store water in a flood situation. Can be higher than the maximum allowable level outlined in a license of occupation but must be under the maximum safety level associated with the facility responsible for the impoundment.
- **FOREBAY** – a reservoir immediately upstream of a generation facilities intake.
- **FRESHET** – the accumulated runoff from total precipitation and snowmelt usually occurring around April but may vary on a year to year basis depending upon climatic conditions.
- **FULL SUPPLY LEVEL** - target water level for a reservoir to optimize power production balancing head (water level) and storage. Storage lakes usually also have a full supply level, particularly if there are interests on the lake other than the power producer. The summer full supply level at lakes or reservoirs that support recreational uses such as cottagers is usually dictated by this recreational concern rather than power optimization.
- **INFLOW DESIGN FLOOD (IDF) LEVEL** - the water level at a dam which is used to assess the safety of a dam with respect to flood passage and stability. The IDF for low hazard dams is often the same as the RF.
- **MAXIMUM OPERATING LEVEL** - the maximum water level to which the reservoir or storage lake is operated under normal operating conditions at a given time of the year.
- **MINIMUM OPERATING LEVEL** - the minimum water level to which the reservoir or storage lake is operated under normal operating conditions at a given time of the year.
- **PEAKING** – generating capability normally designed for use only during the maximum load period of a designated time period.
- **PEAKING PLANT**- generation stations that are normally operated only to provide power during maximum demand.

- **RAMPING RATE** – The rate of change of flow or rate of change of WSE (water surface elevation) usually measured immediately below the facility or at a specified downstream location. The time at which it takes a peaking generation station to go from near zero flow to full generating capacity. Rising ramping rate is the rate at which the flow is opened. Receding rate is the rate at which the flow is closed off.
- **RATING CURVE** - a graph showing the relationship between the stage, usually plotted vertically (Y-axis) and the discharge, usually plotted horizontally (X-axis).
- **RESERVOIR** – an artificial water body created to store water and then deliver it to the intake system via a penstock.
- **REGULATORY FLOOD (RF) LEVEL or MAXIMUM FLOOD LEVEL** - the maximum level of a reservoir dictated by flood damage to property around the reservoir. The REGULATORY FLOOD also applies to rivers as well as reservoirs. It is the flood level below which development restrictions apply in an organized area per MNR's Natural Hazards Policies. A facility may have two flood levels; one where flood damage starts to happen and a higher one defining the Regulatory Flood. The Regulatory Flood is the flood represented by the higher of the following: 1) Observed historical flood 2) Flood induced by the hypothetical Timmins Storm rain event 3) 1:100 year flood.
- **SPILLWAY** - a structure over or through which excess or flood flows are discharged. If the flow is controlled by gates, it is a controlled spillway, if the elevation of the spillway crest is the only control it is an uncontrolled spillway (weir).
- **SPILLWAY CAPACITY** – the maximum amount of water that can be passed through or over the spillway.
- **STOP LOGS** – a series of logs that acts as a gate which can be placed into an opening at a hydro facility to regulate the flow of water. The gate is not permanently connected to a lifting device but can be manually manipulated.
- **STORAGE LAKE** - the lake on the upstream side of a dam that does not have a hydro generating plant, but is used to store water for other plants further downstream. The dams at these lakes are almost always controlled by stoplog sluiceways. They usually are operated sporadically and have a rather sporadic record of water levels. Many remote storage lakes would only typically be operated in the spring and fall (logs out in the fall for winter drawdown to catch spring runoff - logs back in at some point during the receding part of the freshet (usually) to catch as much of the freshet as possible and bring the water level back up to summer normal level).
- **WINTER DRAWDOWN** – the level at which a reservoir is reduced to in order to allow for increased water volumes associated with spring freshet.
- **KILOWATT (KW)** - 1000 (10^3) Watts.
- **MEGAWATT (MW)** - 1,000,000 (10^6) Watts.
- **GIGAWATT (GW)** - 10^9 Watts.
- **TERAWATT (TW)** - 10^{12} Watts.
- **KILOWATT-HOUR (kWh)** - the kWh is the energy equivalent to one kilowatt of power expended for one hour of time. The kWh is a widely used measure of electricity consumption. One kWh represents 3,600,000 joules (3.600×10^6 J). To obtain joules when kilowatt-hours are known, multiply by 3.600×10^6 . To obtain kilowatt-hours when joules are known, multiply by 2.778×10^{-7} .

Links to Water Resources Glossaries and Dictionaries:

www.edwardsaquifer.net/glossary.html#C

www.glossarist.com/science/earth-science/hydrology.asp

www.crh.noaa.gov/hsd/hydefa-c.html#B

http://cap.water.usgs.gov/GIP/h2o_gloss/#B

<http://lenntech.com/water-glossary.htm>