

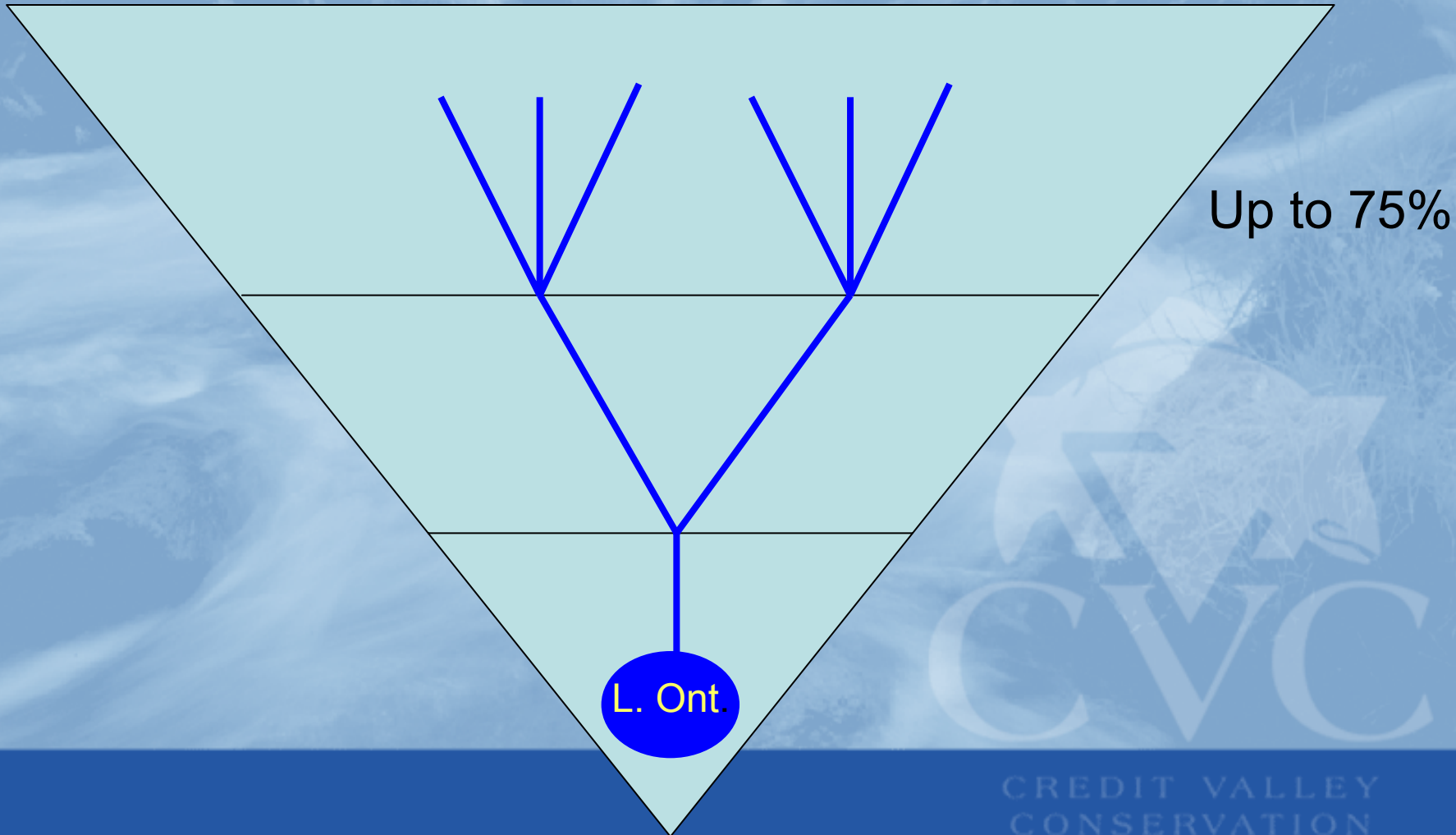
Headwater Drainage Feature Assessment Guidelines

- Preserving Ontario's Headwaters:
- Community Workshop
- Terra Cotta March 4, 2010



Law of Stream Orders

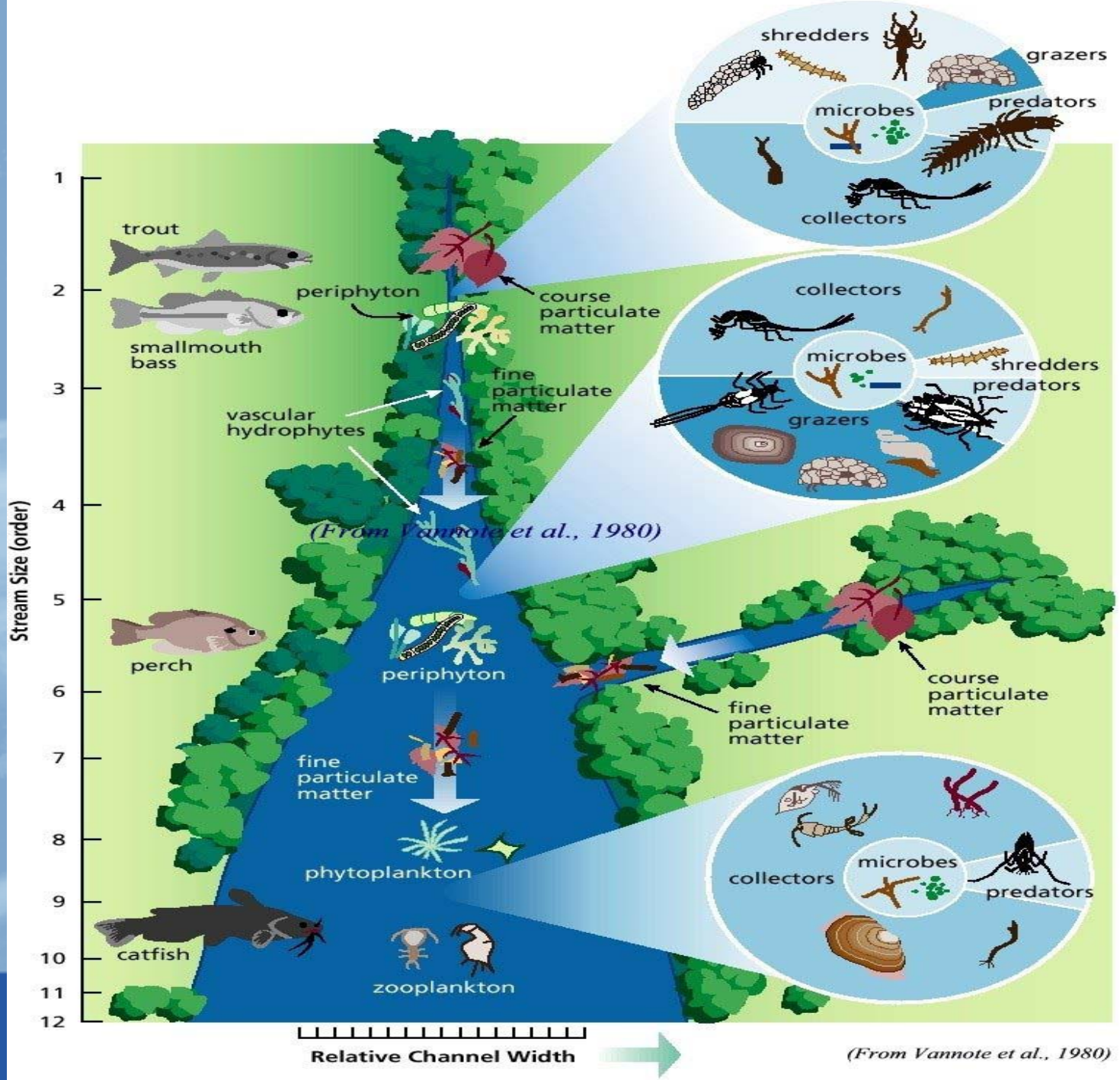
- “geometric relationship” = cumulative benefits & impacts



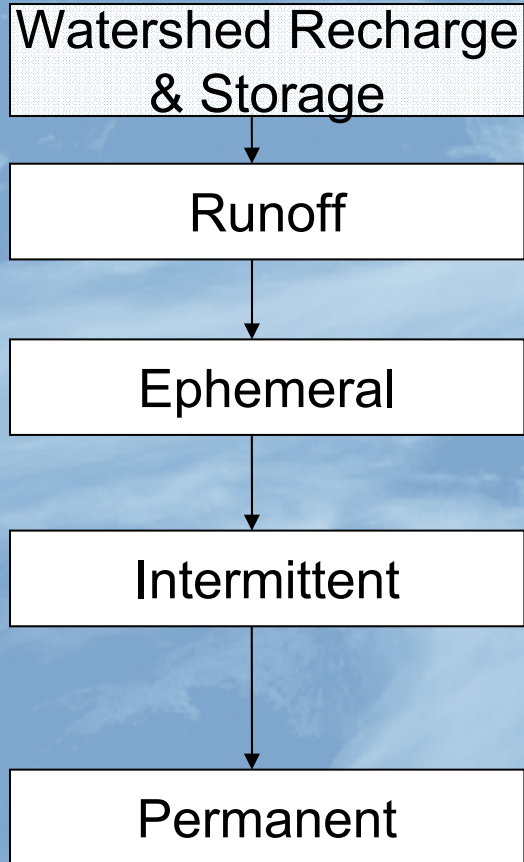
River Continuum Concept

- Streams are gradients or continua of energy (allochthonous/autochthonous)
- Processes produce a continuous and predictable change in the assemblages of organisms (bugs) along the stream system
- Downstream processes are linked / product of all upstream contributions
- HDF cumulative and different in form & function
- Extend / focus concept to HDF features / functions including all disciplines





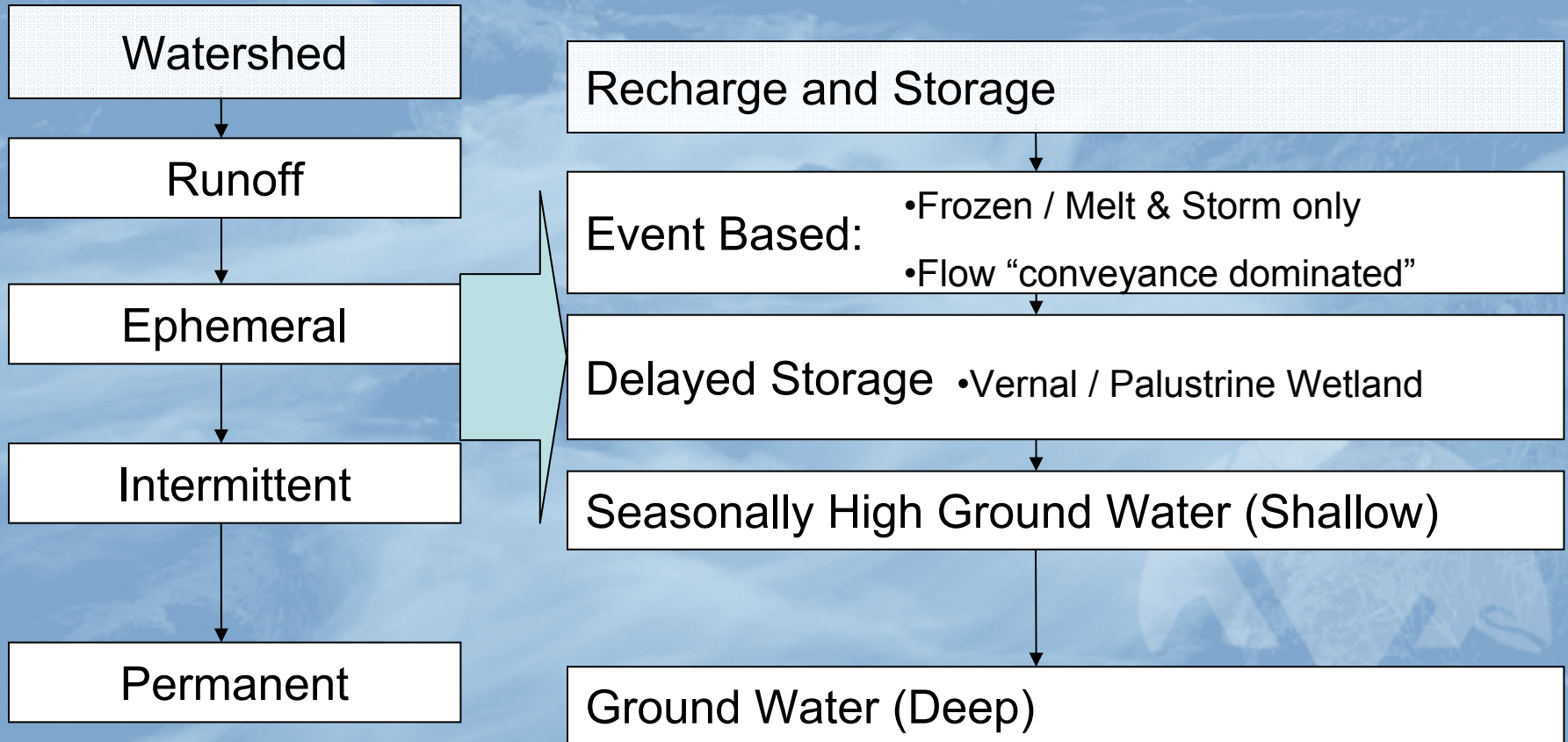
Flow Regime



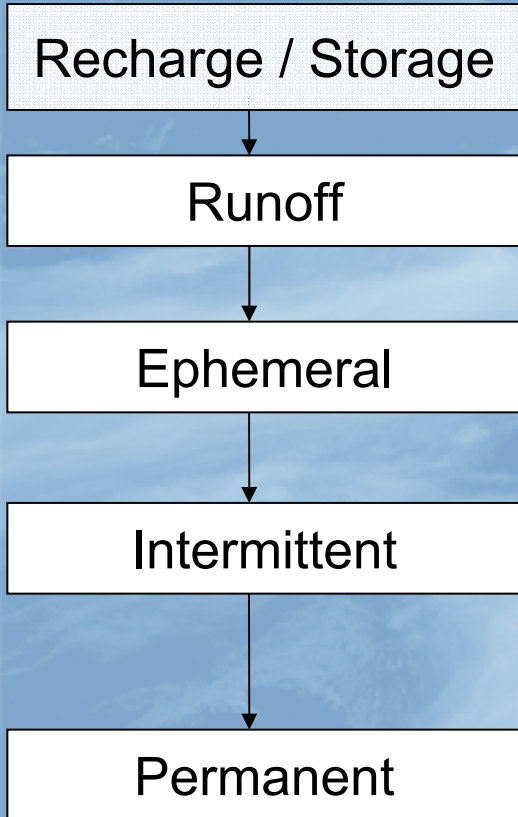
- Form: function of discharge and slope
- Undefined low gradient swales to well defined rills/gullies and channels
- Flow recurrence intervals & hydroperiods best determine classification



Flow Functions



Sediment/Geomorphology



Low-High ?

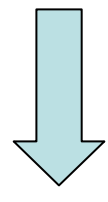
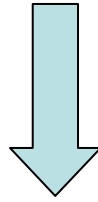
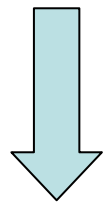
CPOM/FPOM

Gradient

Ill Define

Erosional

Fine-Coarse?



Low

Well

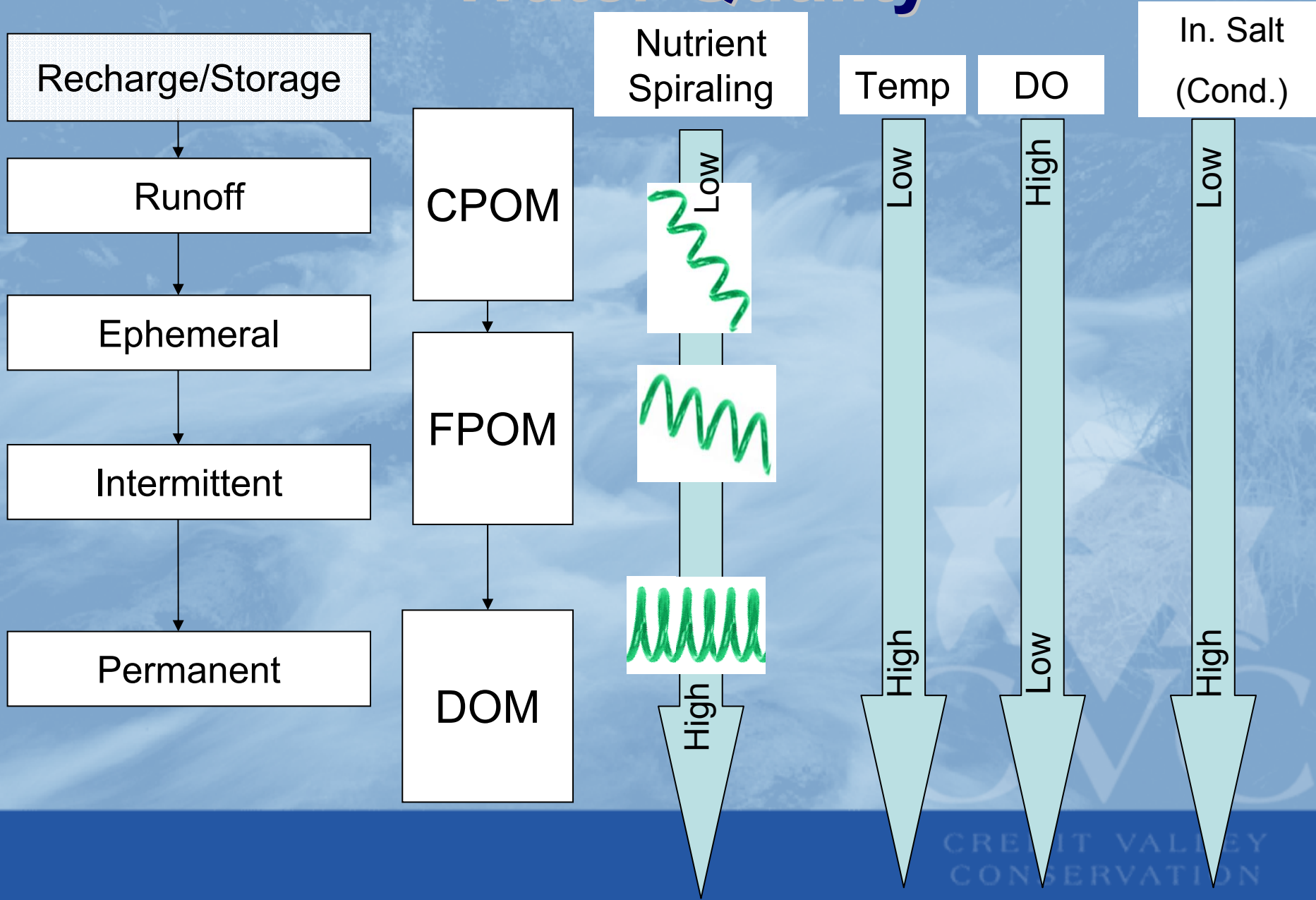
Depositional

Fine

Gradient

Defined

Water Quality

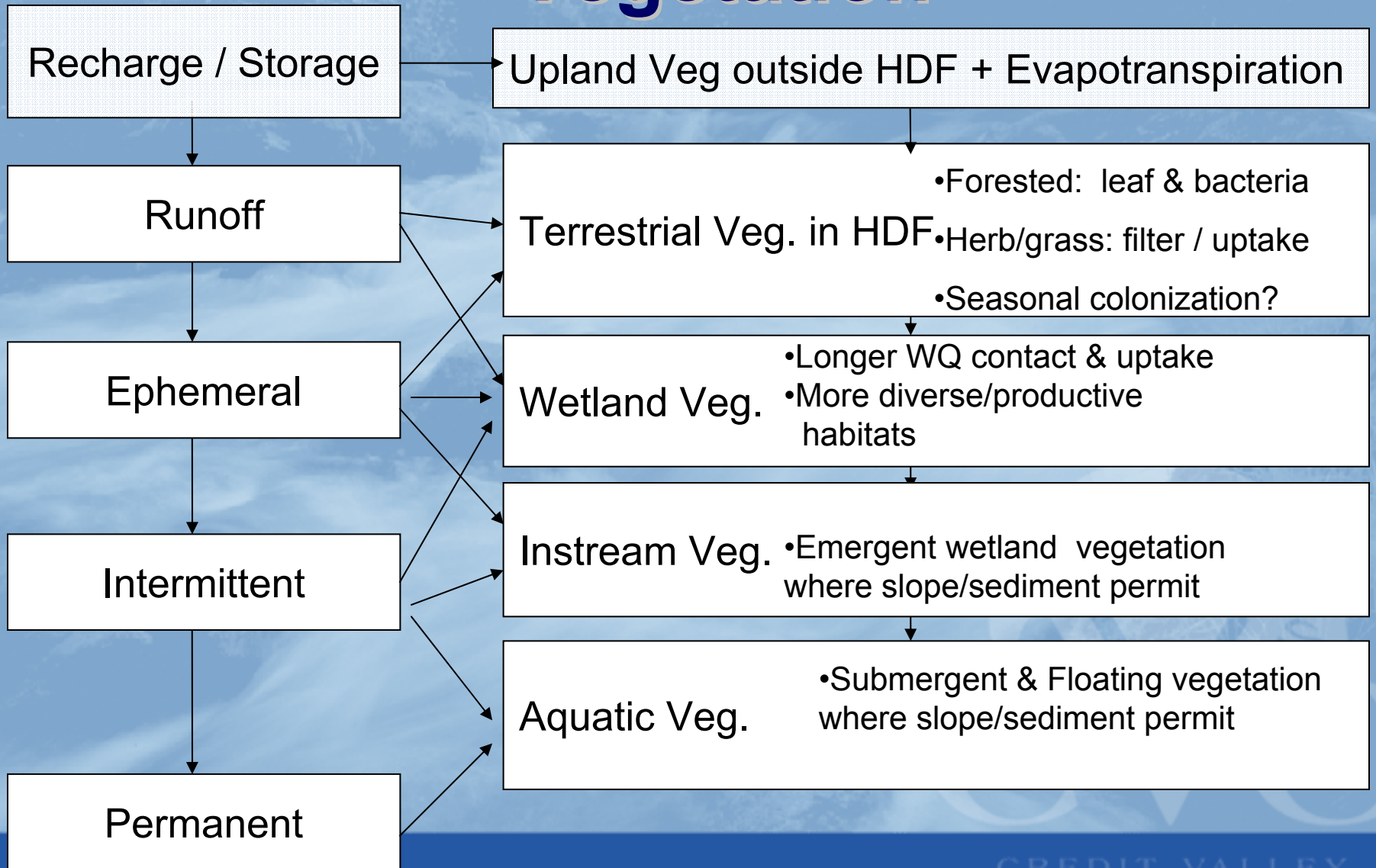


HDF Vegetation

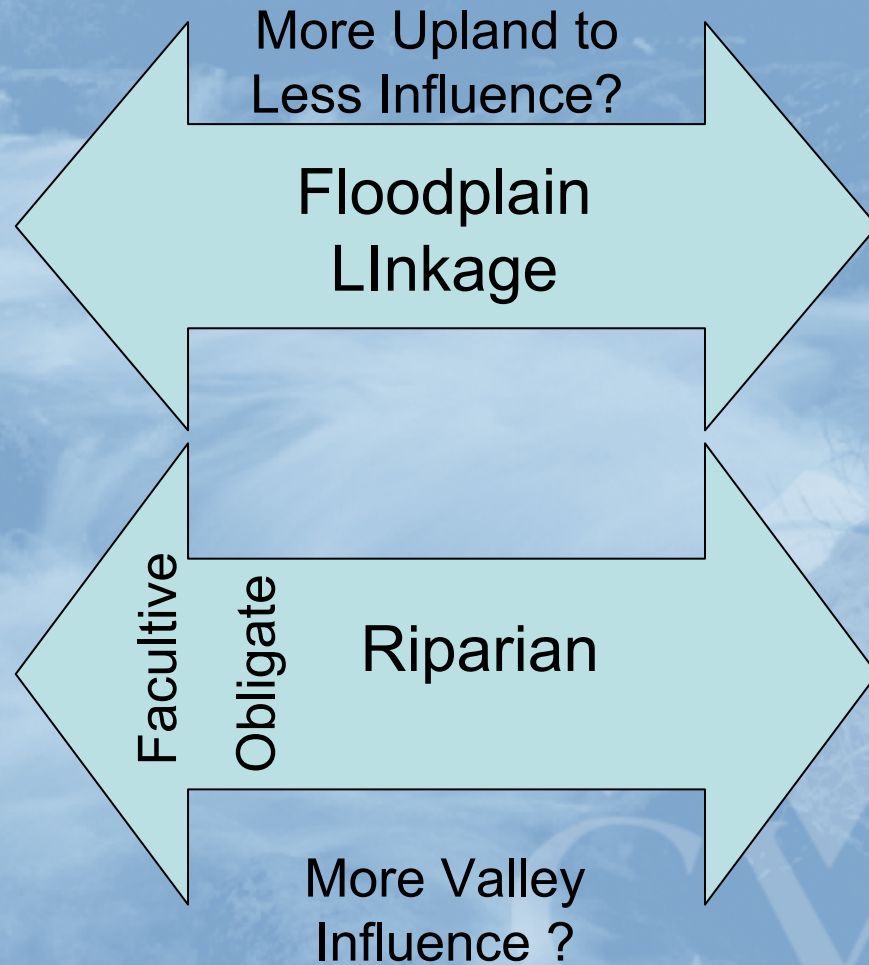
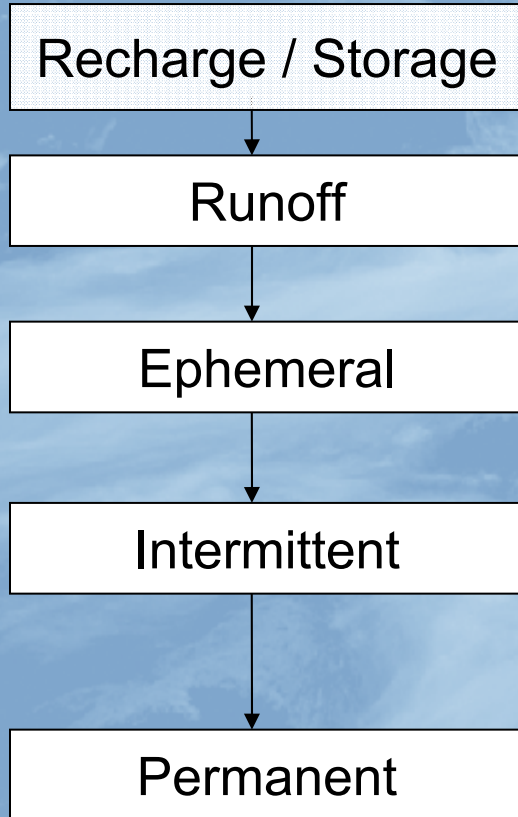
- Unvegetated/ploughed = Human Modifier not criteria
- Consider potential or historical system (or up & d/s)
- Riparian Wood & Leaf inputs
- Riparian Water Quality Functions (veg filter & uptake)
- Thermal Shading Functions vs summer hydroperiod?
- Habitat Functions (amphibians / wildlife food, cover & corridors and fish)



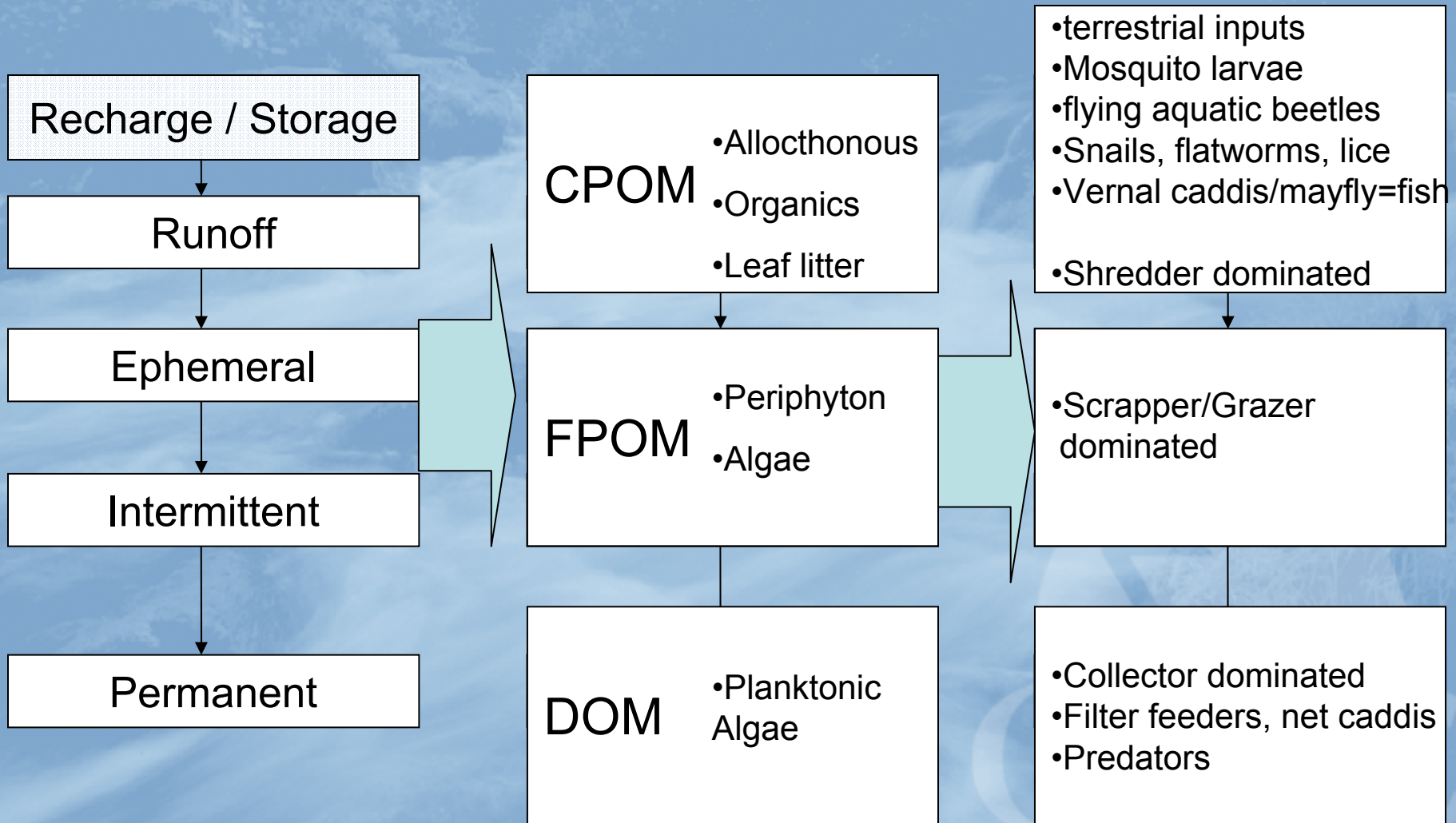
Vegetation



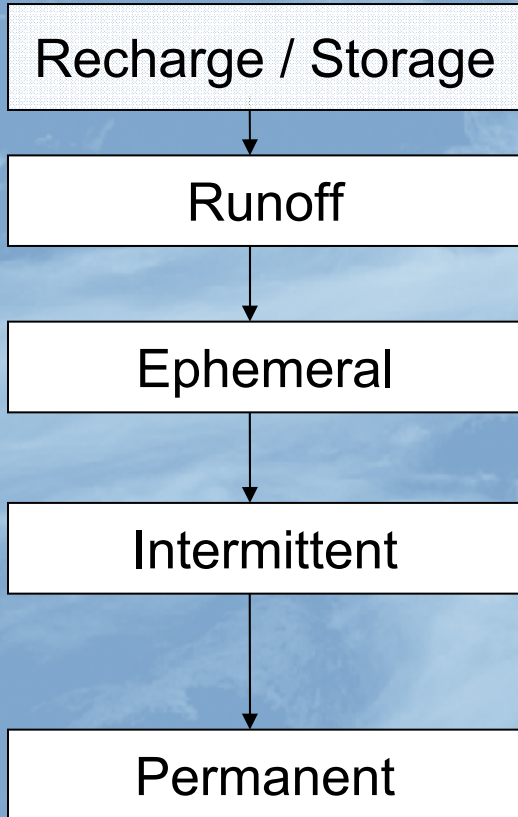
X- Valley Vegetation



Organic Inputs and Benthos

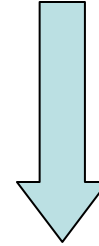


Refuge Habitats



Low density

Temporary Refuge Pools



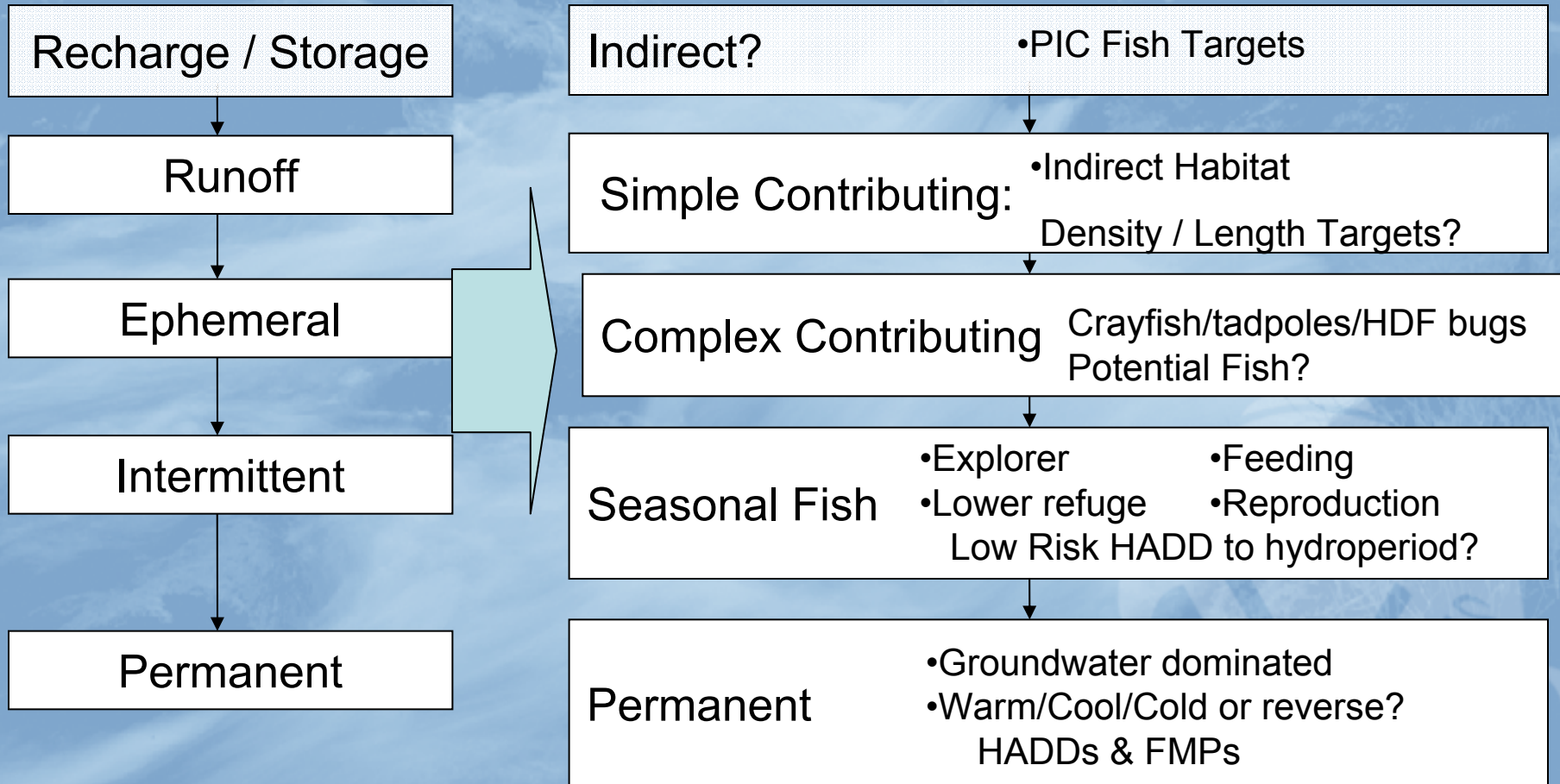
High density

Permanent Refuge Pools

Over wintering Pools

Consider scour pools, barriers and ponds

Fish Habitat & Mngt. Targets



Score	1	2	3	4	5
Functions	Simple		Complex		Seasonal
Flow Hydroperiod	Dry by mid May		Wet to minimal flow		Flowing late April/May
Channel & Floodplain Geomorph	Undefined low gradient channel or floodway		Partially defined channel or floodway		Definable channel or floodway
Substrate	Poorly defined, sorted or fine		Partially or only pools or riffles defined		Well defined, sorted or coarse
Instream & Floodway Riparian Veg	Unveg if forested or terrestrial spp.	Some obligative or facultative dominated	Dominated by obligative wetland spp	Algae	Aquatic spp in channel or wetland riparian veg
Food	Organic and terrestrial invertebrates	Mosquito larvae	Flying aquatic beetles	Snails	Leeches Cased caddis
Fish	none	Single “explorers” some wet years or refuge close to confluence		Feeding migrations some years	Feeding & Breeding most years
Refuge Pools	Few and temporary pools dry by May		Refuge pools temporary to permanent supporting invertebrates		Regular occurrence of permanent refuge pools or lasting into summer

Protection of Headwater Drainage Features

- Historically buried and sewerred in urban areas
- Agricultural ditching less impact with more restoration potential.
- Seasonal fish habitats more recently being identified and protected
- Wetland and Source Water Protection linkages being recognized
- Legislation and policies need to evolve with emerging science.
- Mapping challenges?



Legislative Tools

Federal Fisheries Act

- Includes migratory and indirect habitat but overused?

PPS/MOE Policies

- Water Quantity and Quality, protection of aquatic life

Conservation Authorities / Watershed Plans / CRFMP

- Fish as indicators of upstream processes
- Regulations now define depressional features and wetlands
- CVC/TRCA Headwater Guidelines

Municipal Official Plans?

Riparian and Property Rights

- Education, valuation and flexibility focused on functional protection



Headwater Restoration

- Maintain / restore features and functions
- Integrate with recharge, storage and delivery features
- SWM wetlands, LID bioswales, “Daylighting”, raingardens ...
- Win-wins, grants, compensation...
- Wetland Restoration Science and Natural Channel Design principals

