



EVALUATING CLIMATE CHANGE IMPACTS ON ALPINE FLOODPLAIN VEGETATION

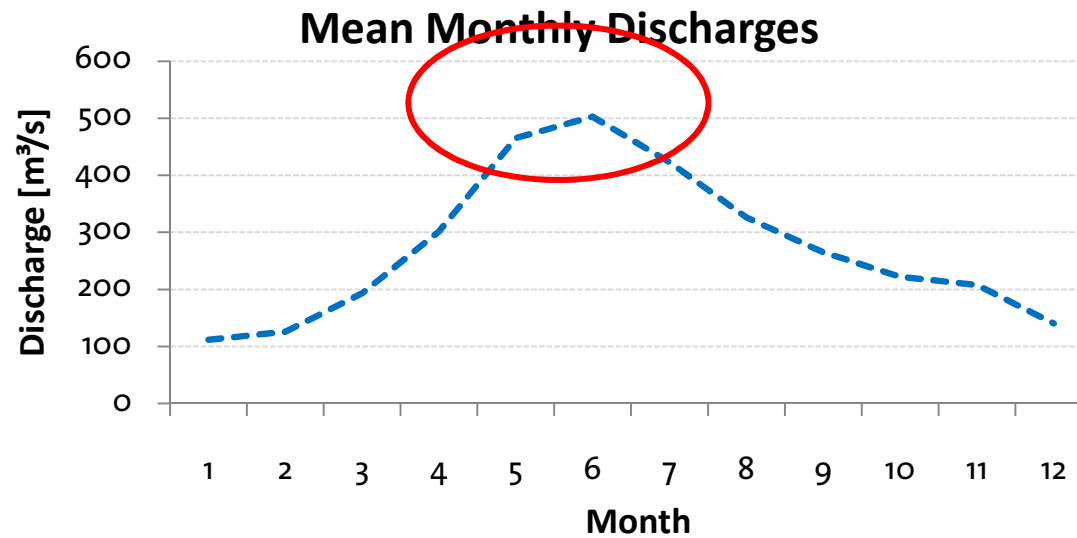
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Environmental Consulting

OUTLINE

- Background
- Objectives
- Dynamic vegetation model
- Study site & Climate change scenarios
- Results
- conclusions



HYDROLOGY & FLOODPLAIN VEGETATION





OBJECTIVE

Quantify climate change impacts on alpine riparian vegetation



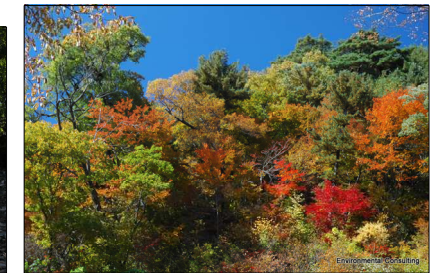


MODEL CONCEPT

•Recruitment vs. Recycling

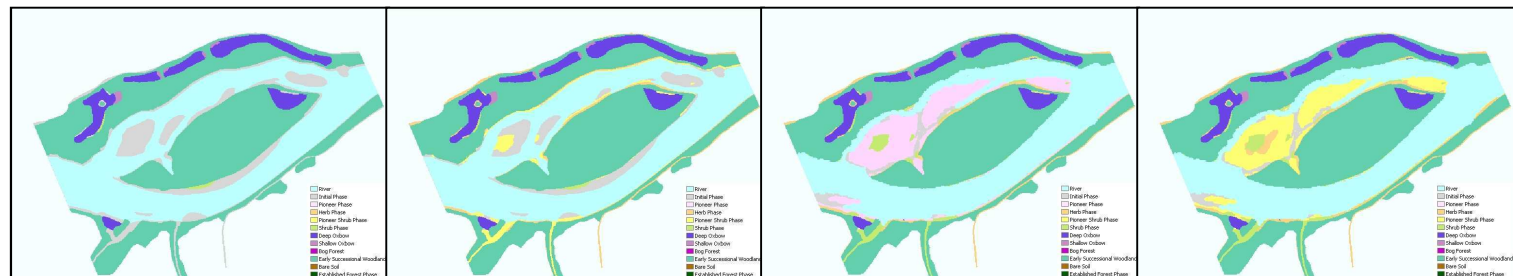


•Time Progression



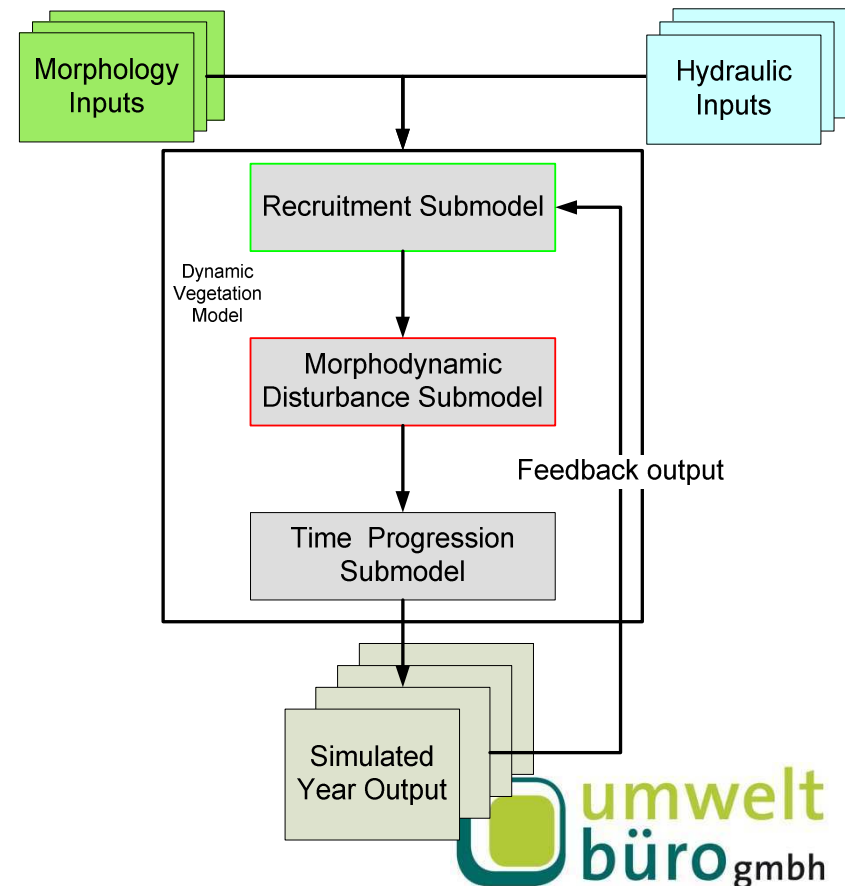
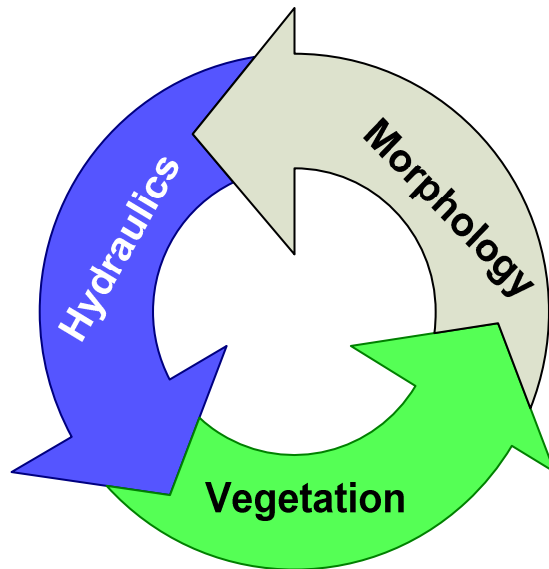
Vegetation Succession Phases Time Effect

•Long term variations in space & time





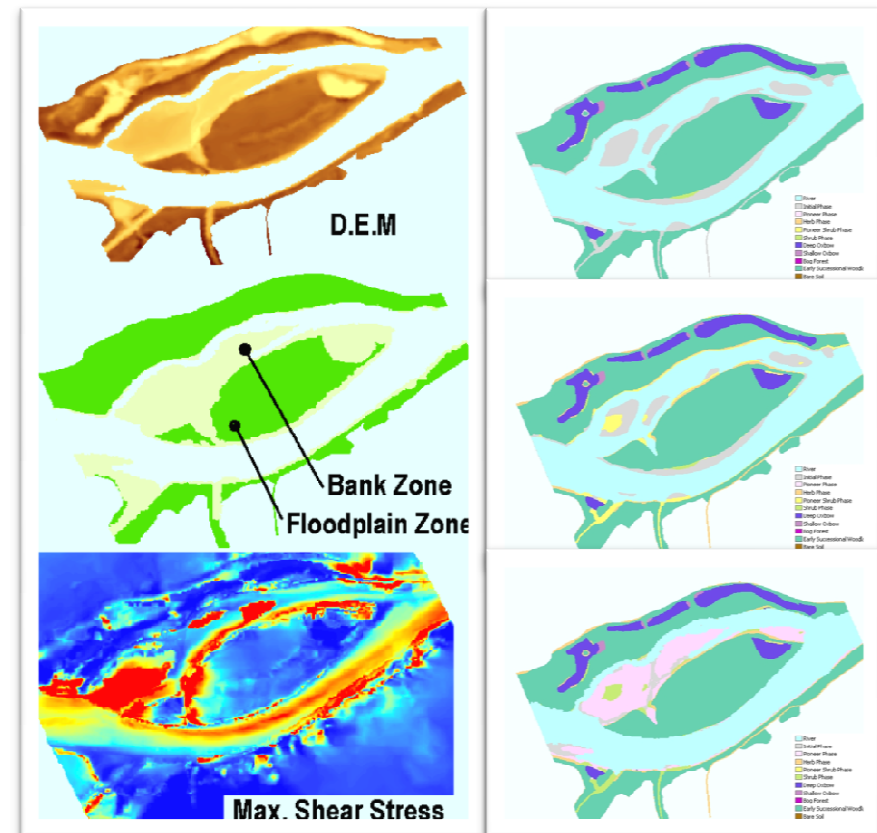
MODEL - STRUCTURE





MODEL INPUTS & OUTPUTS

- Topography
- Ground water
- Bank zone
- Floodplain zone
- Shear stress
- Simulated years raster
- Area balance





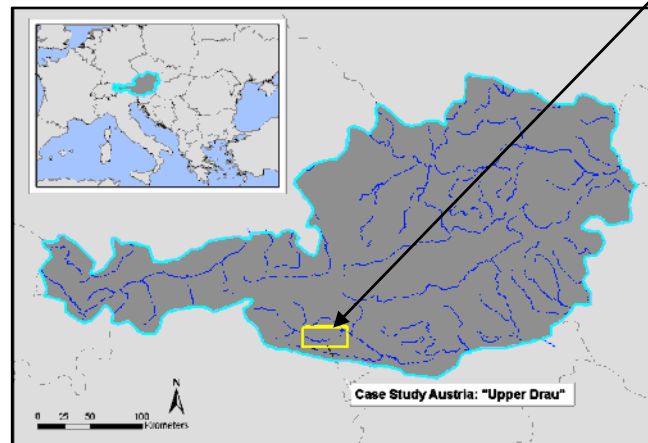
CASE STUDY-SITE

Upper Drau River (Austria):

- Typical alpine river
- No flow regulation upstream
- Channelized in the 1940s, restored in 2002
- Re-establish ecological functionality
- Indicator (endangered) species



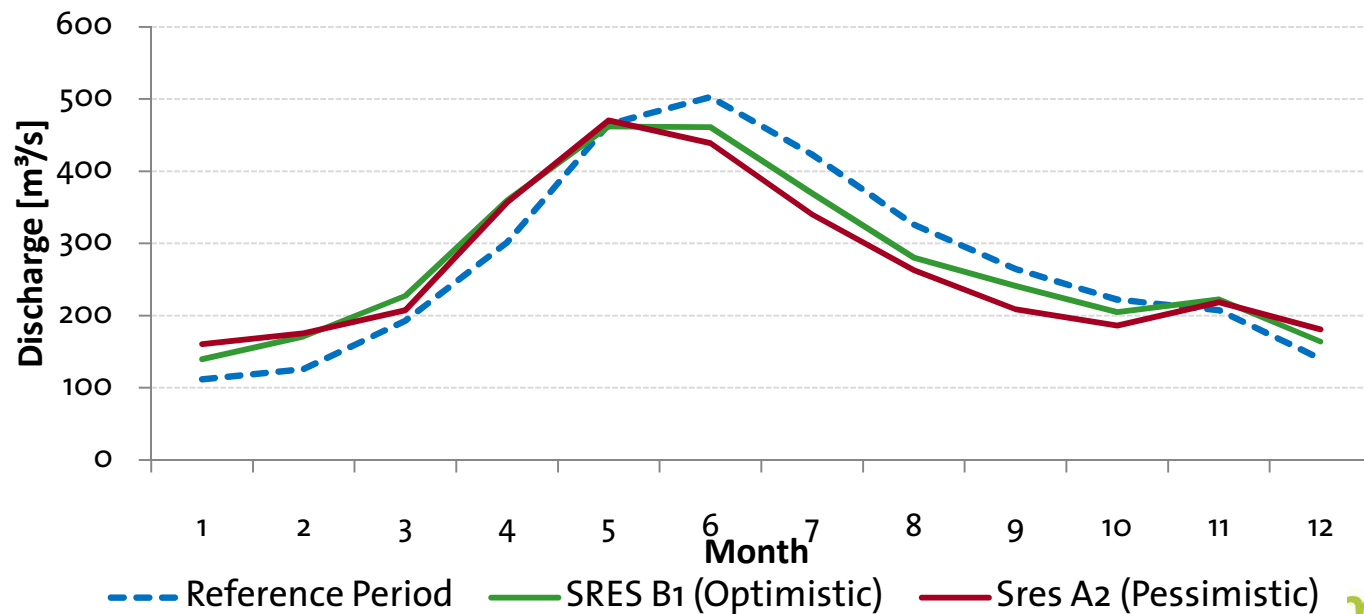
Myricaria germanica





- Reference period (1960-1990)
- Optimistic scenario- SRES B1 (2070-2100)
- Pessimistic scenario- SRES A2 (2070-2100)

SCENARIOS MONTHLY DISCHARGE VARIATIONS AT THE DRAU RIVER



Scenarios reference: Climate model: GCMECHAM5, Climate Change 2007 IPCC

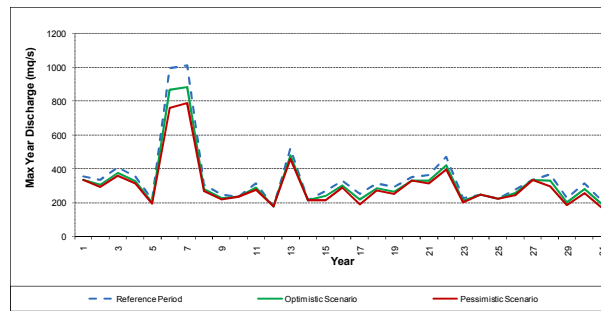
Chart source: KlimaAdaptReport



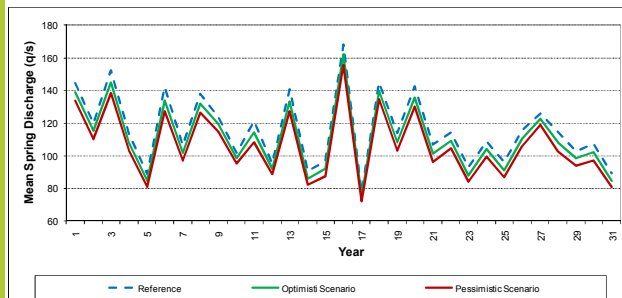
BOUNDARY

CONDITIONS

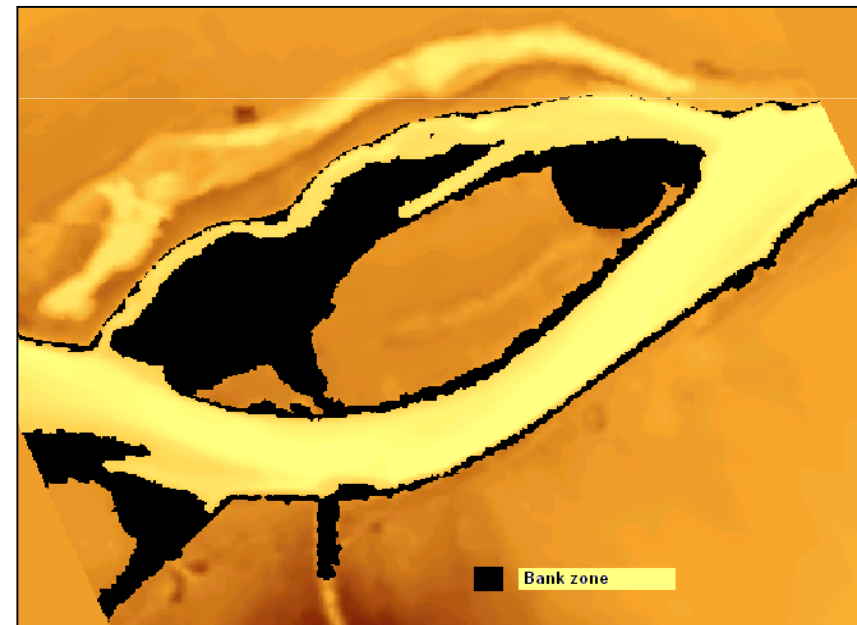
- Simulated time: 31 years
- Differ for groundwater & shear stress inputs list (every year)



Max year discharge

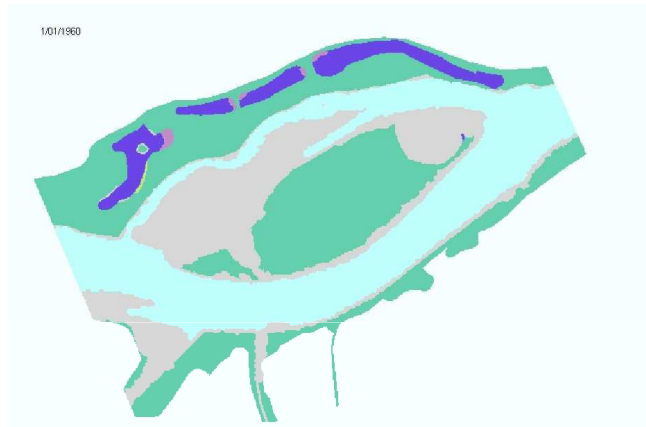


Mean spring discharge

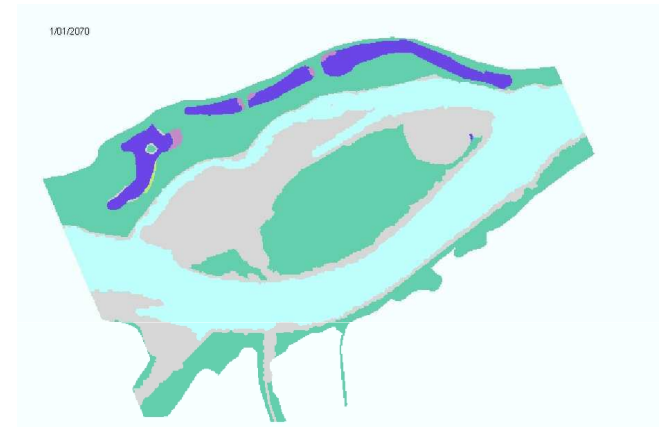




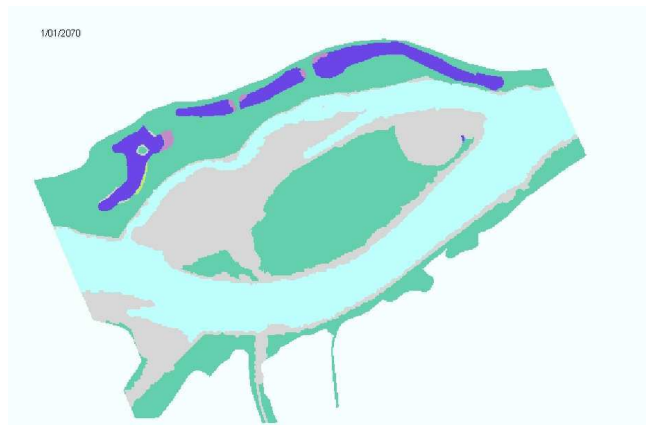
SCENARIOS SIMULATIONS



Reference (1960-1991)



Optimistic (2070-2100)

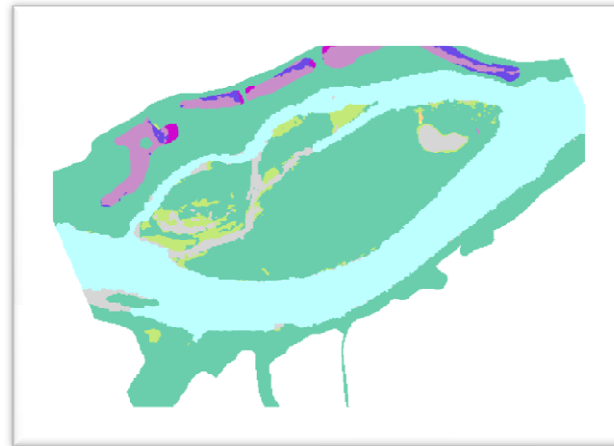


Pessimistic (2070-2100)

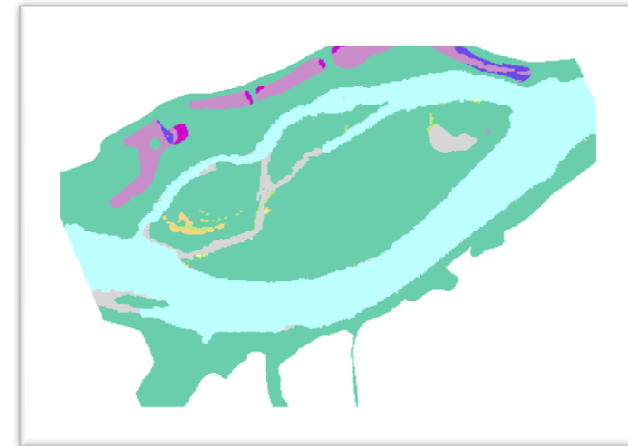
- River
- Initial Phase
- Pioneer Phase
- Herb Phase
- Pioneer Shrub Phase
- Shrub Phase
- Deep Oxbow
- Shallow Oxbow
- Bog Forest
- Early Successional Woodland
- Established Forest Phase



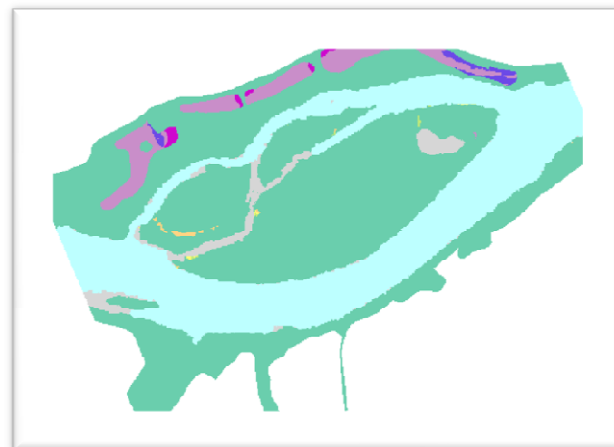
SCENARIOS-LAST SIMULATED YEAR



Reference (1960-1991)



Optimistic (2070-2100)



Pessimistic (2070-2100)

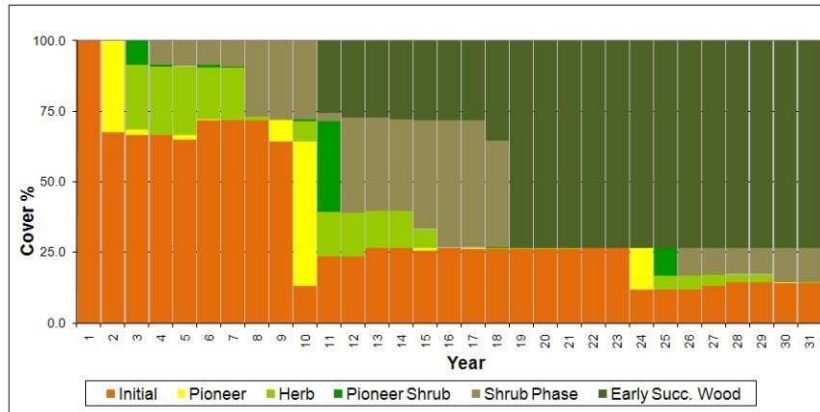
Legend

- River
- Initial Phase
- Pioneer Phase
- Herb Phase
- Pioneer Shrub Phase
- Shrub Phase
- Deep Oxbow
- Shallow Oxbow
- Bog Forest
- Early Successional Woodland
- Established Forest Phase

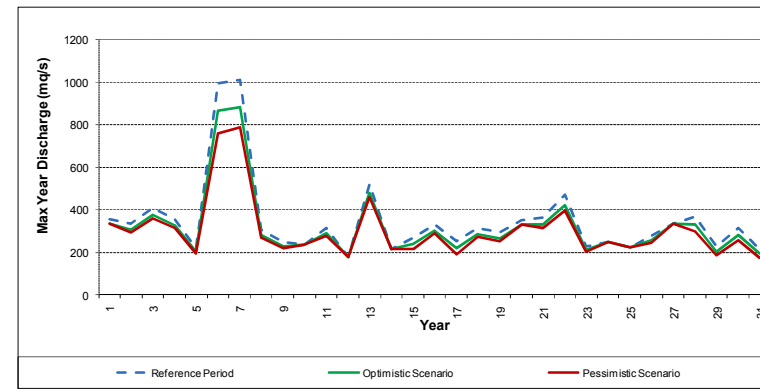


BANK ZONE RELATIVE AREA BALANCE CHARTS

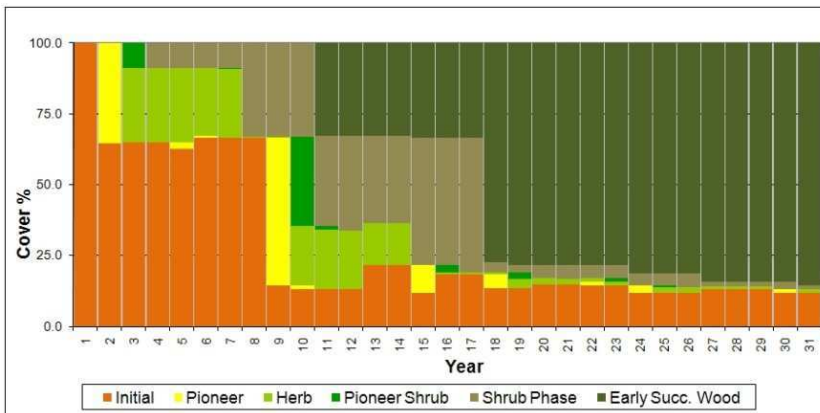
REFERENCE PERIOD 1960-1990



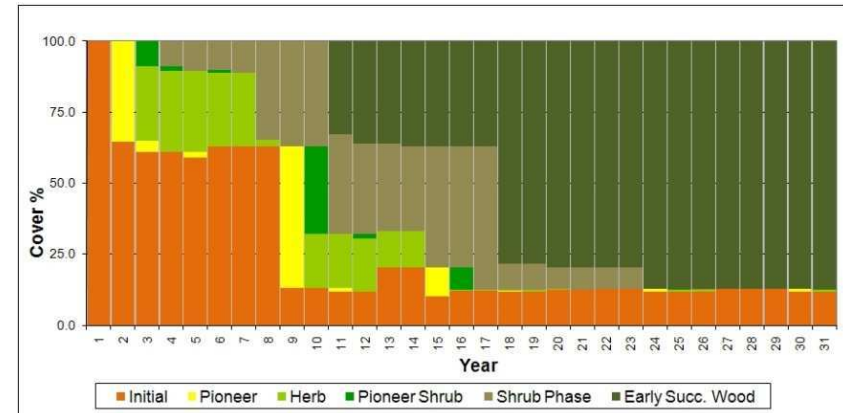
MAX DISCHARGES



OPTIMISTIC SCENARIO 2070-2100



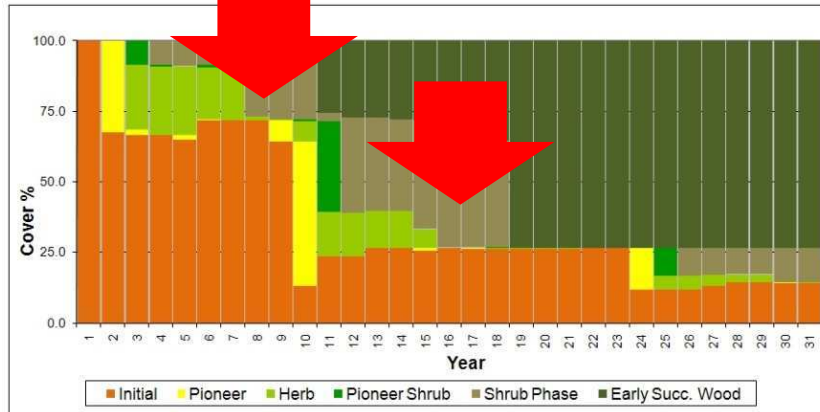
PESSIMISTIC SCENARIO 2070-2100



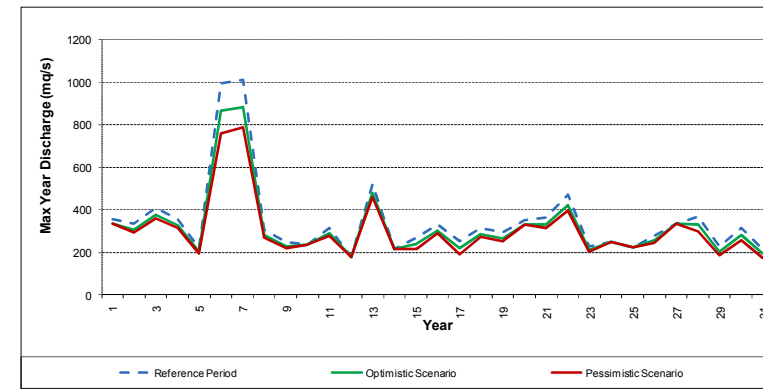


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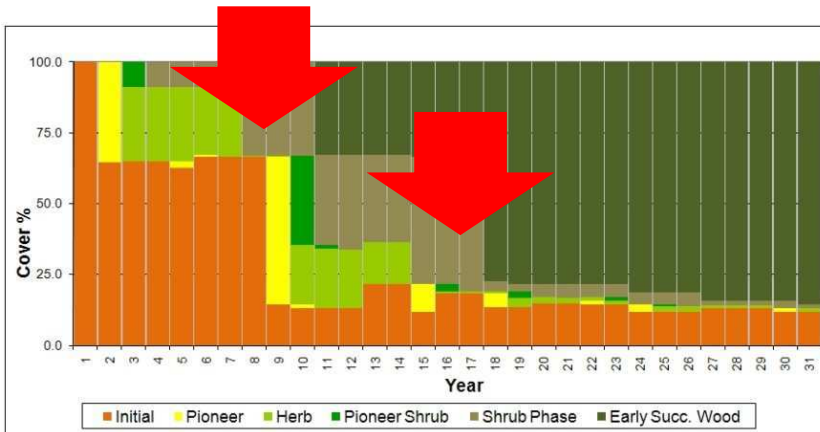
REFERENCE PERIOD 1960-1990



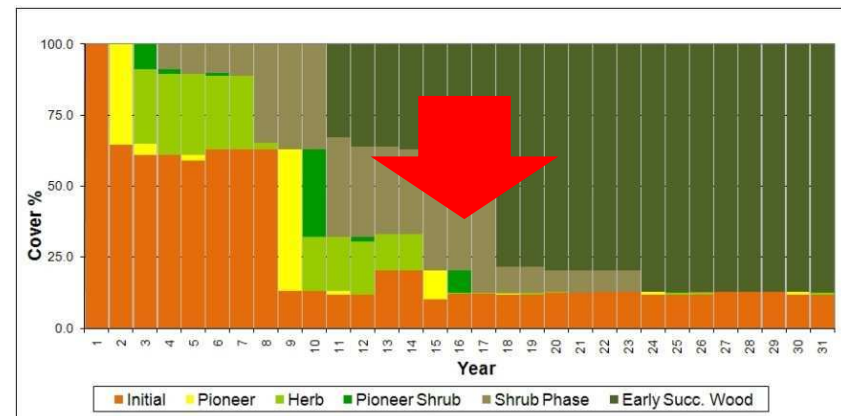
MAX DISCHARGES



OPTIMISTIC SCENARIO 2070-2100



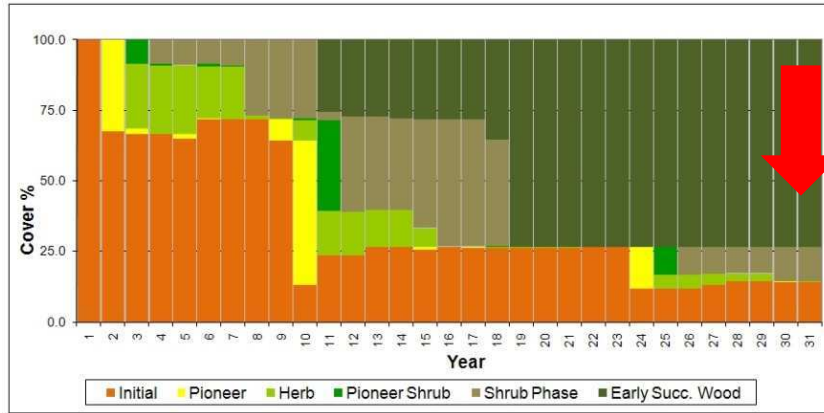
PESSIMISTIC SCENARIO 2070-2100



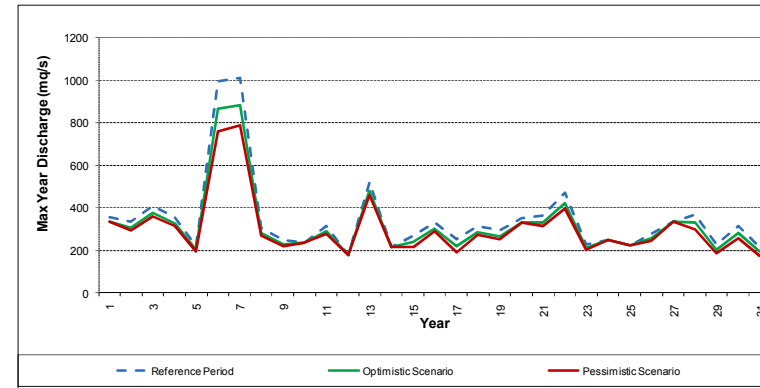


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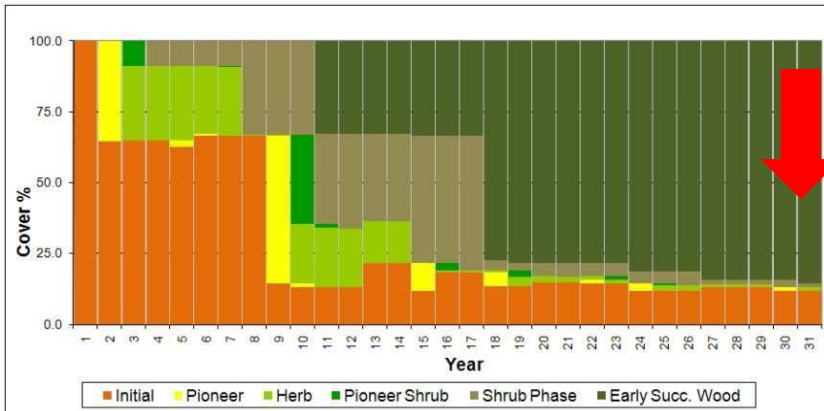
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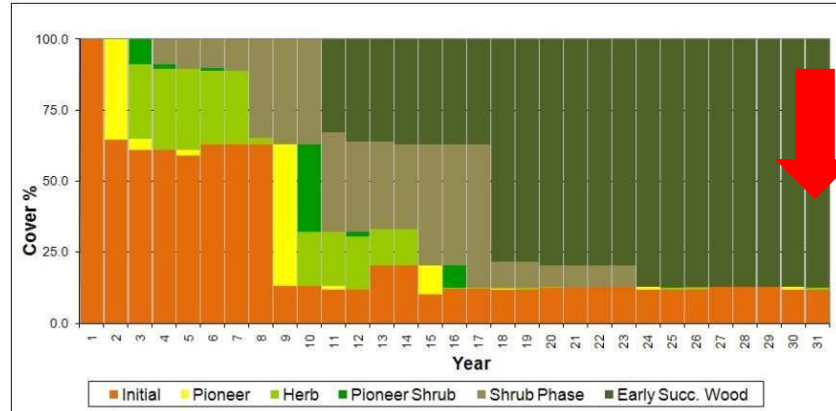
MAX DISCHARGES



OPTIMISTIC SCENARIO 2070-2100



PESSIMISTIC SCENARIO 2070-2100



An aerial photograph of a braided river system in a mountain valley. The river is composed of multiple channels of light blue water that meander across a wide, sandy and gravelly floodplain. The surrounding landscape is a mix of green forested hills and rugged, rocky mountains in the background under a hazy sky. The text is overlaid on the left side of the image.

**CLIMATE CHANGE LONG TERM EFFECTS:
DECREASES FLOODPLAIN VEGETATION RENEWAL
INCREASES ECOLOGICAL FUNCTIONALITY LOSS
RATE**