Introduction

- What is the conservation cost of a typical wetland in a virtual Saskatchewan agricultural landscape which accounts for wetland ecosystem benefits and downstream drainage cost?

- This study will address the above question.

- Society needs the monetary value of benefits from wetland retention to perform effective cost-benefit valuations of wetland conservation programs.

- Study area is Saskatchewan at the quarter section farm level.

Simulation: What if Scenarios

- We will investigate the effect of:
  - Climate change on wetland conservation cost.
  - Improved agricultural technology on Wetland conservation cost.
  - Changes in crop prices on wetland conservation cost.
  - Current Saskatchewan provincial wetland policies on wetland conservation cost.
- We will focus on Canola and Spring Wheat crops.

Wetland Data Generation

- A total of 14000 quarter sections were generated.
- Wetland with the quarter sections were grouped into 5 tiers: tier 1 – 5.
- Tier 1 contains the headwater wetland.
- Tier 1 wetlands are farthest from tier 5 while tier 2 wetlands are closest.
- Wetland distribution follows the ratio 24:12:6:3:1 for tier 1:tier 2 : tier 3 : tier 4 : tier 5.
- Wetland sizes are at most 37 acres (Brunet and Westbrook (2011))
- Wetland sizes become progressively bigger as we approach tier 1 (headwater wetland)

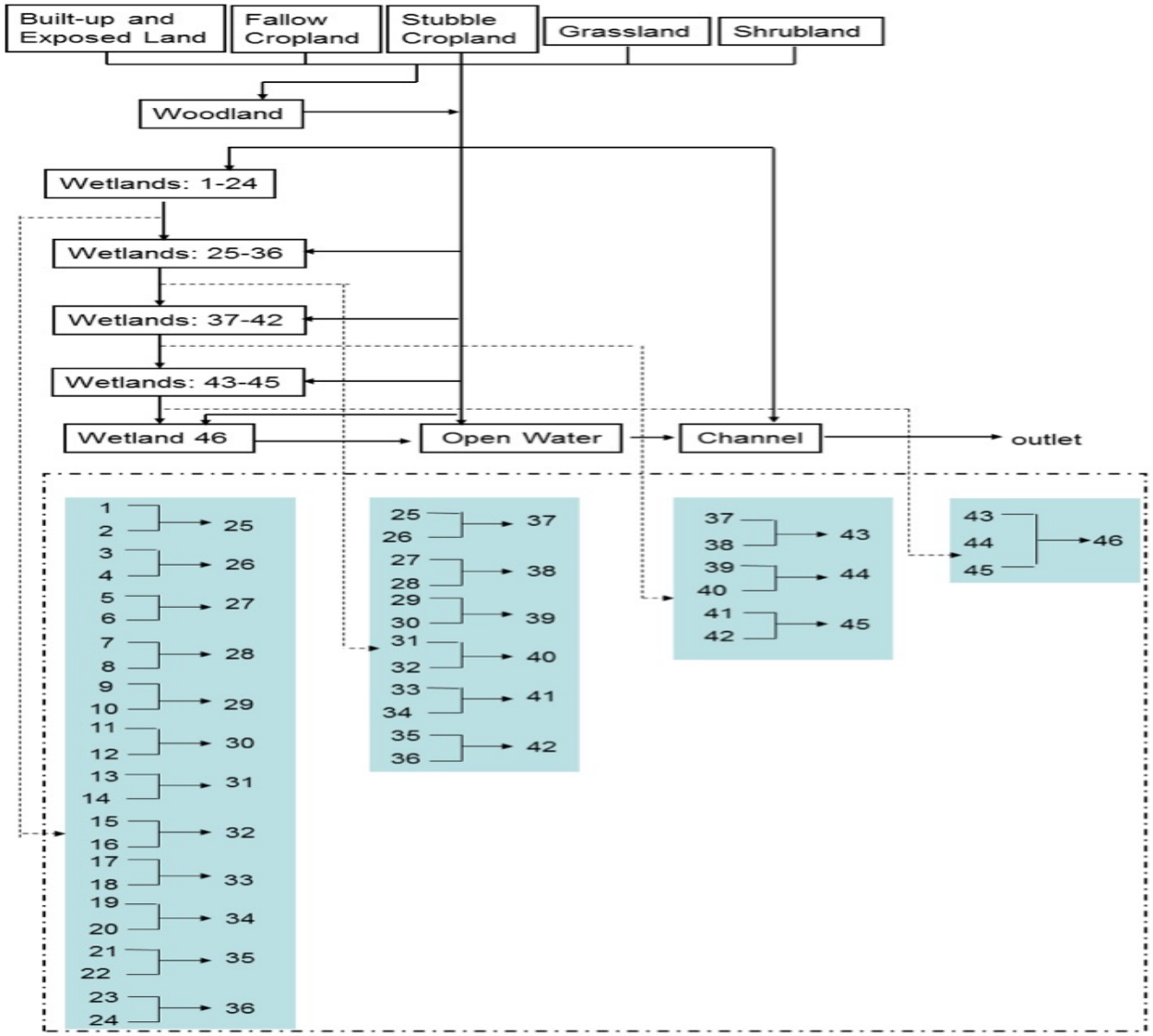
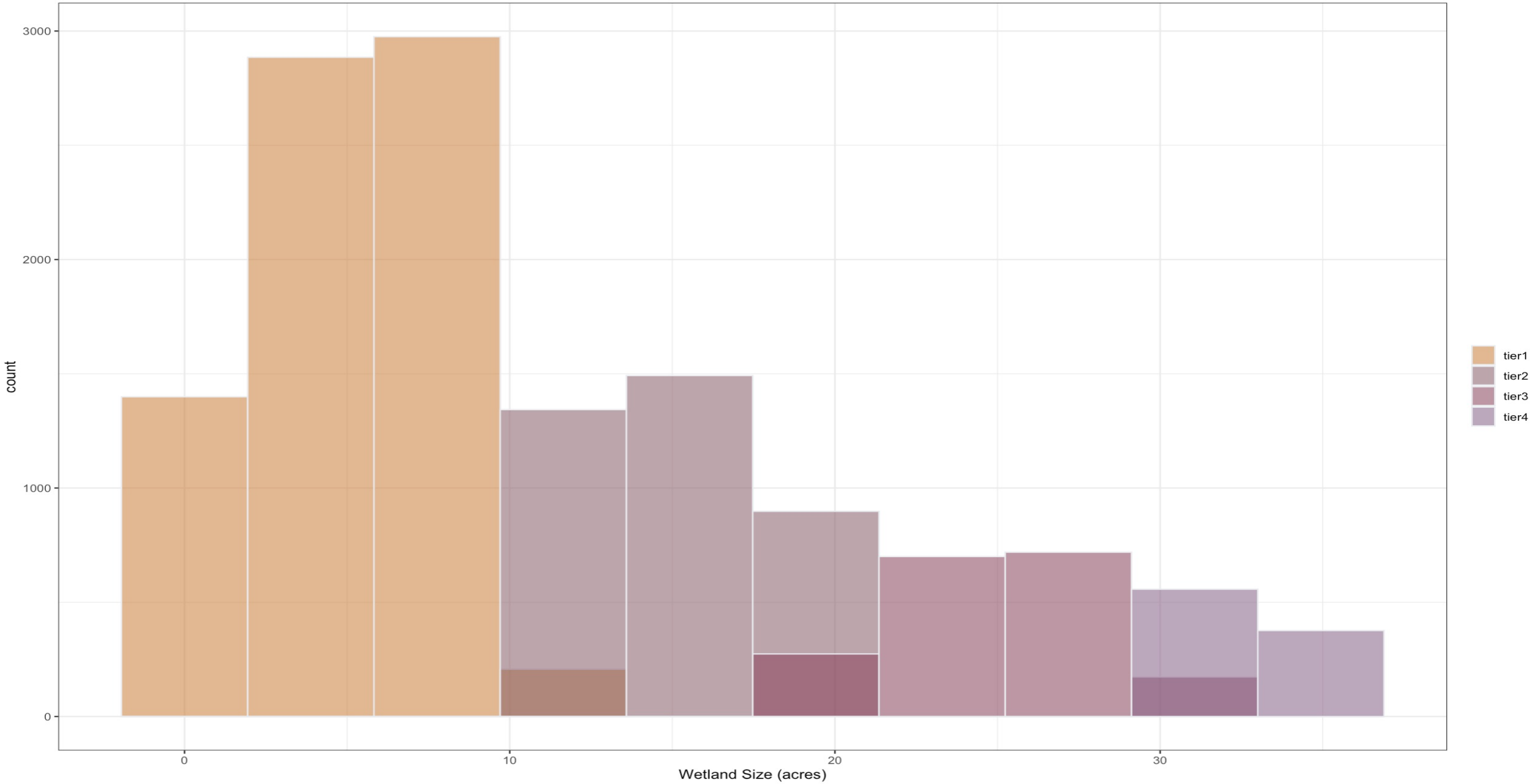


Figure 1. Routing sequence within sub-basin with dynamical depressional storage network. Source : Pomeroy et al. 2012.

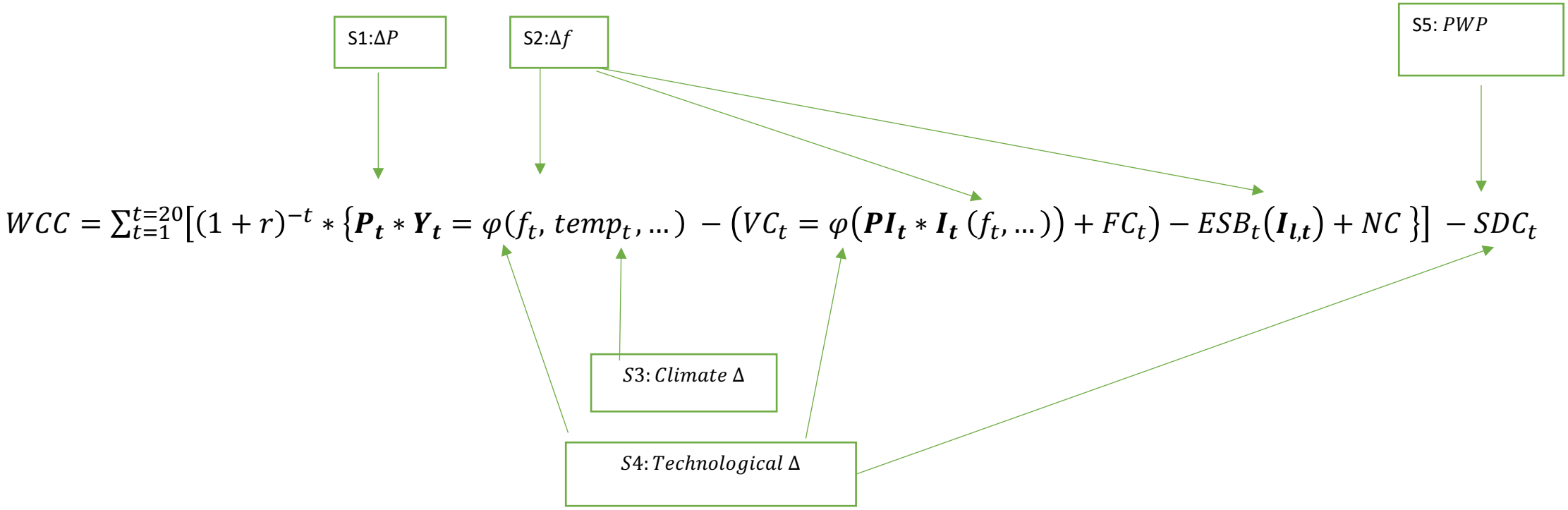
Distribution of Wetland Acreage Across Tiers of Wetlands



Summary Statistics

Variable	Tier 1 Mean (SD)	Tier 2 Mean (SD)	Tier 3 Mean (SD)	Tier 4 Mean (SD)
Drainage Cost	400.30	400.07	402.60	395.06
	(114.75)	(115.71)	(114.31)	(117.46)
Probability of Harvest	0.90	0.85	0.82	0.80
	(0.06)	(0.09)	(0.10)	(0.11)
Canola Total fixed Cost	151.75	151.75	151.75	151.75
Wheat Total fixed Cost	152.11	152.11	152.11	152.11
Canola Total Variable Cost	351.80	351.80	351.80	351.80
Wheat Total Variable Cost	238.96	238.96	238.96	238.96
Canola Price	6.42	6.42	6.42	6.42
Wheat Price	5.42	5.42	5.42	5.42
Number of Wetlands	7466	3733	1866	933

Conceptual Model



Where:	
WCC is wetland conservation cost;	FC is fixed cost;
r is interest rate;	NC is nuisance cost;
P is vector of crop prices;	ESB is ecosystem benefit;
Y is vector of crop yields;	SDC is one-time surface drainage cost;
f is fertilizer use; temp is temperature;	φ is a function notation; all variables at measured at time t;
VC is variable cost;	+(-) is a positive(negative) change;
PI is vector of price of inputs;	PWP is provincial wetland policies;
I is vector of levels of input use;	QS is quarter section. WCC is at the farm level (quarter section).