APEX Calibration and Validation: Modeling Nutrient Losses to Groundwater

WILLAMETTE PARTNERSHIP

LAYING THE GROUNDWORK FOR MORE EFFECTIVE CONSERVATION.

PROJECT OBJECTIVE:

Understand effects of farm level practices on nutrient contributions to groundwater in Southern Willamette Groundwater Management Area

WILLAMETTE PARTNERSHIP:

Set-up, calibration, and validation of the APEX model for application in the GWMA. Apply calibrated model to stakeholder questions.

TODAY'S OBJECTIVES:

- Introduce the model and modeling effort
- Gather feedback expertise and resources available

Nutrient Tracking Tool

- Estimate site-specific nutrient reductions from BMPs
- User friendly interface
- Decision support, nutrient trading

Agricultural Policy & Environmental eXtender (APEX)

- Mechanistic and empirical edge-of-field model
- Field-scale and small watershed
- Very powerful, complex

Project Timeline

- Spring 2014
  WP Selected for modeling
- Summer 2014
  Gather data and plan calibration
- Fall 2014
  Conduct calibration and validation
- Spring 2015
  Report on results, gather feedback
- Summer 2015
  Report to EPA
- Fall 2015
  Hand over model to EPA

Agricultural Policy & Environmental eXtender

- Spatial scale: Field to small watershed
- Temporal scale: Daily time step
- Temporal range: Up to 100 years

Agricultural Policy & Environmental eXtender

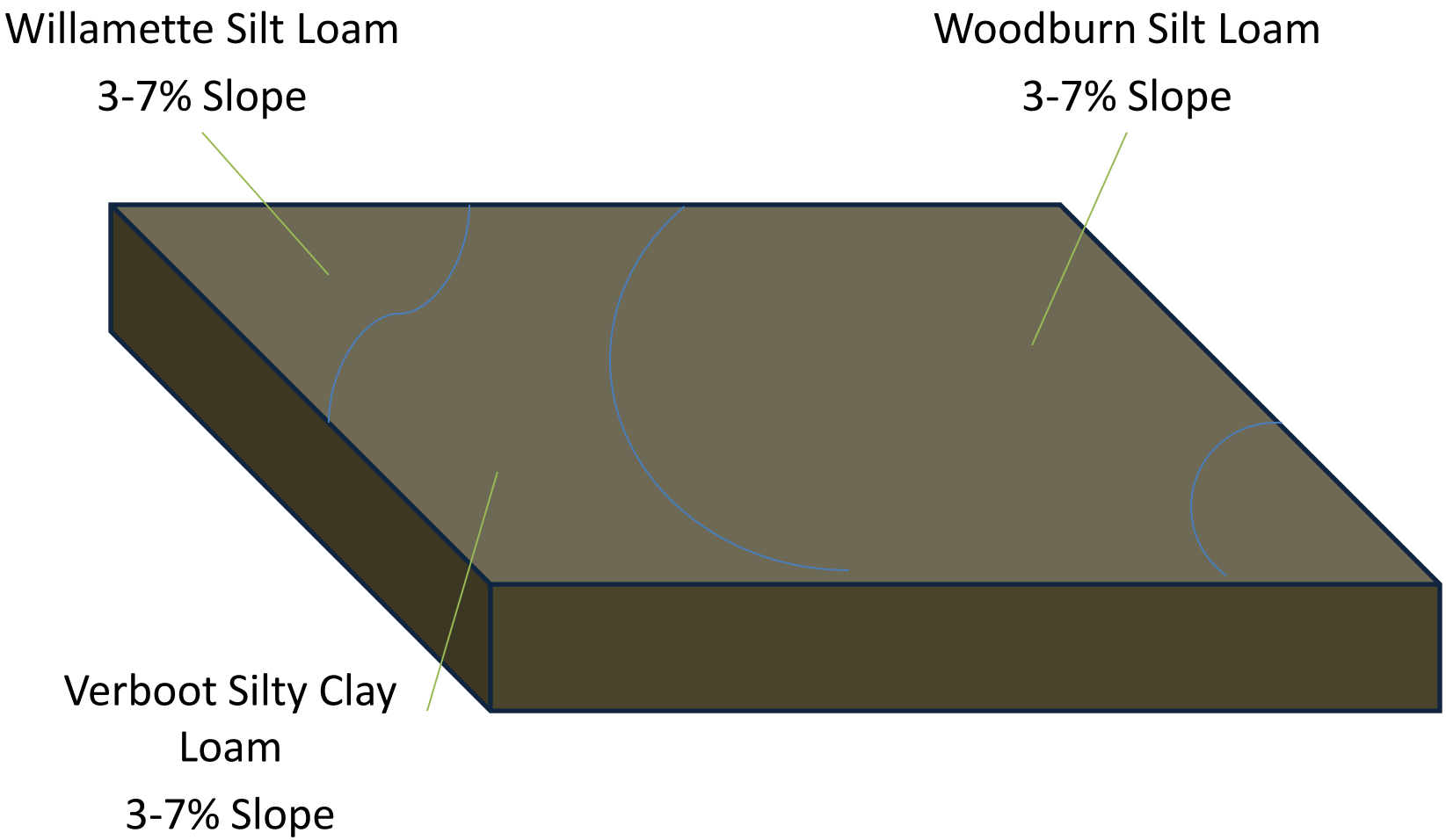
- Management variables
  - Cropping /grazing systems
  - Nutrient/manure management
  - Tillage management
  - Irrigation management
  - Buffer BMPs

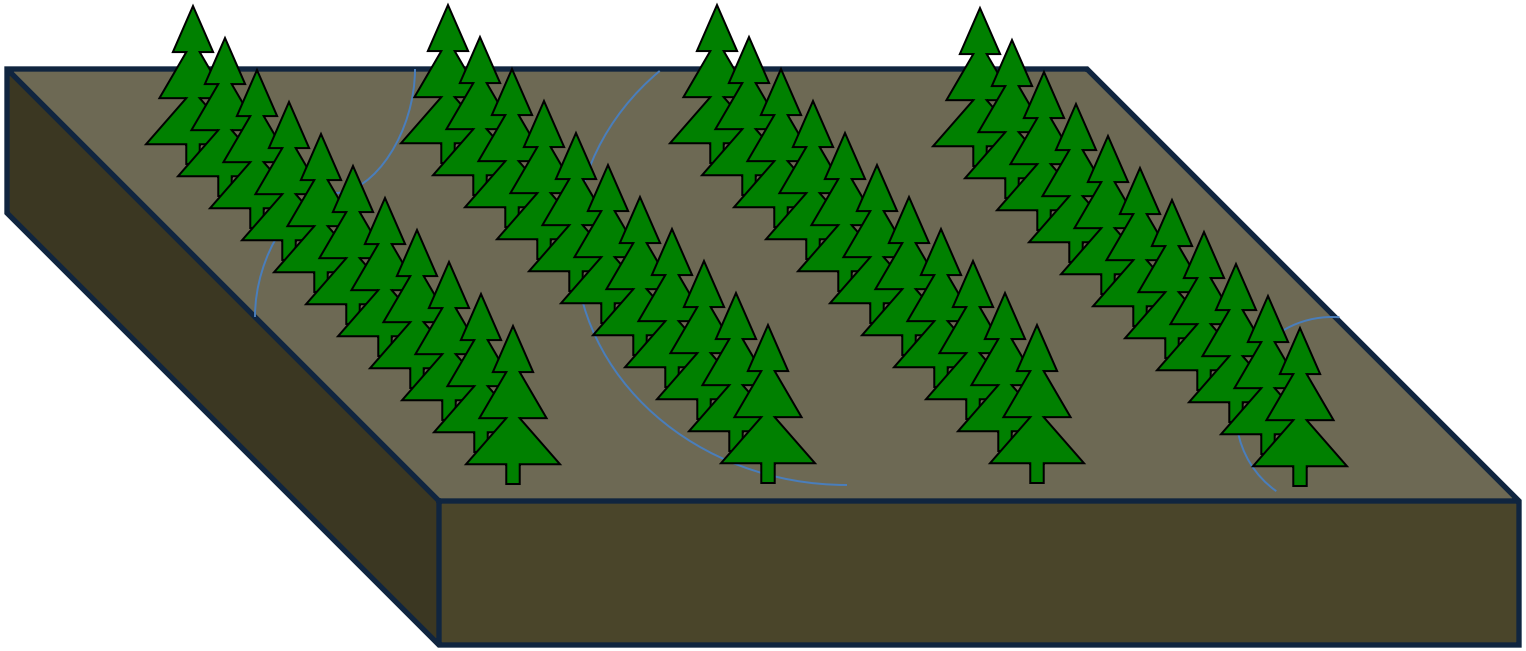
APEX inputs

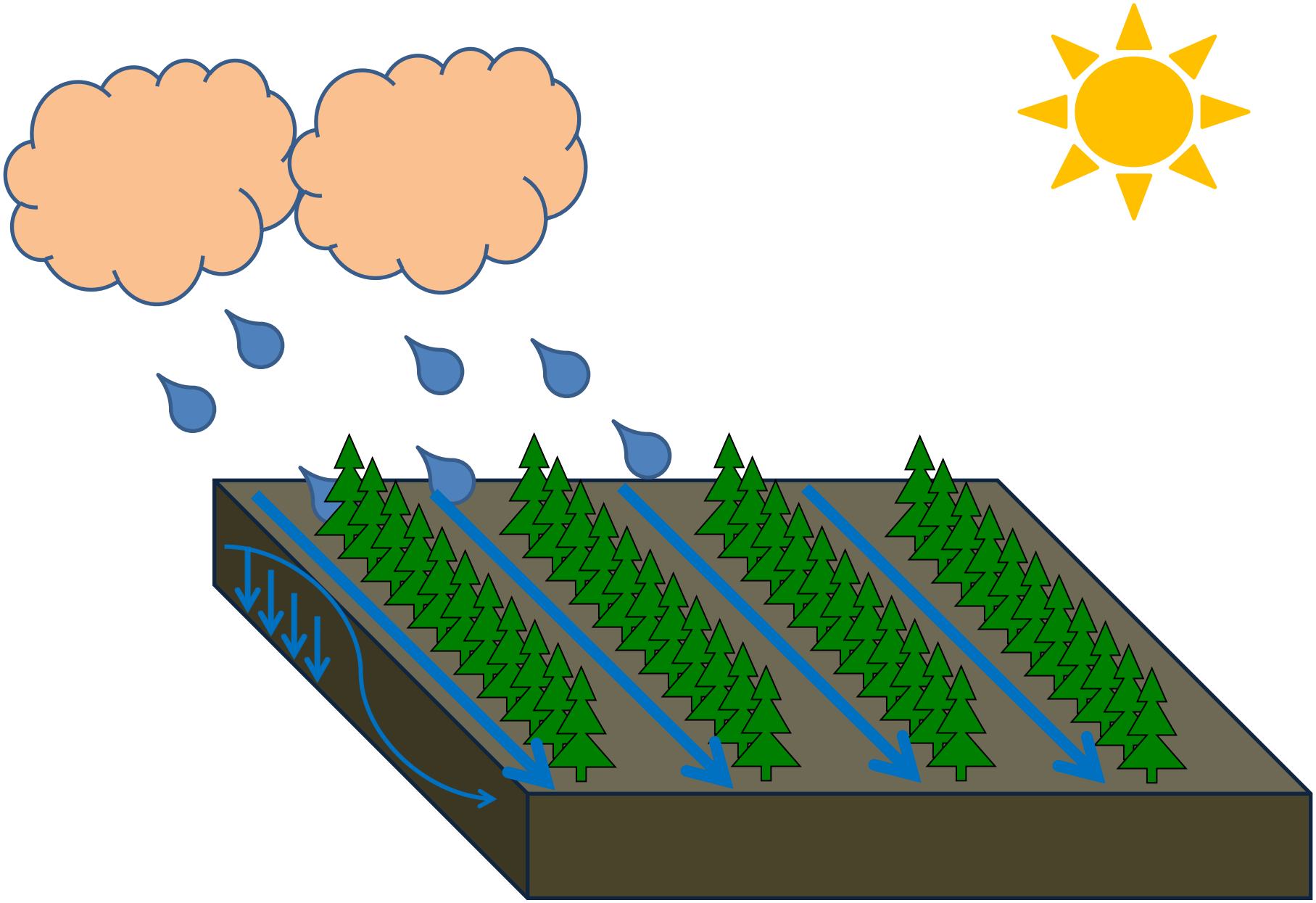
- Weather (daily)
- Soils (measured data)
- Management practices
  - Cropping systems
  - Fertilizer/manure/nutrient management
  - Pesticide management
  - Tillage management
  - Irrigation management

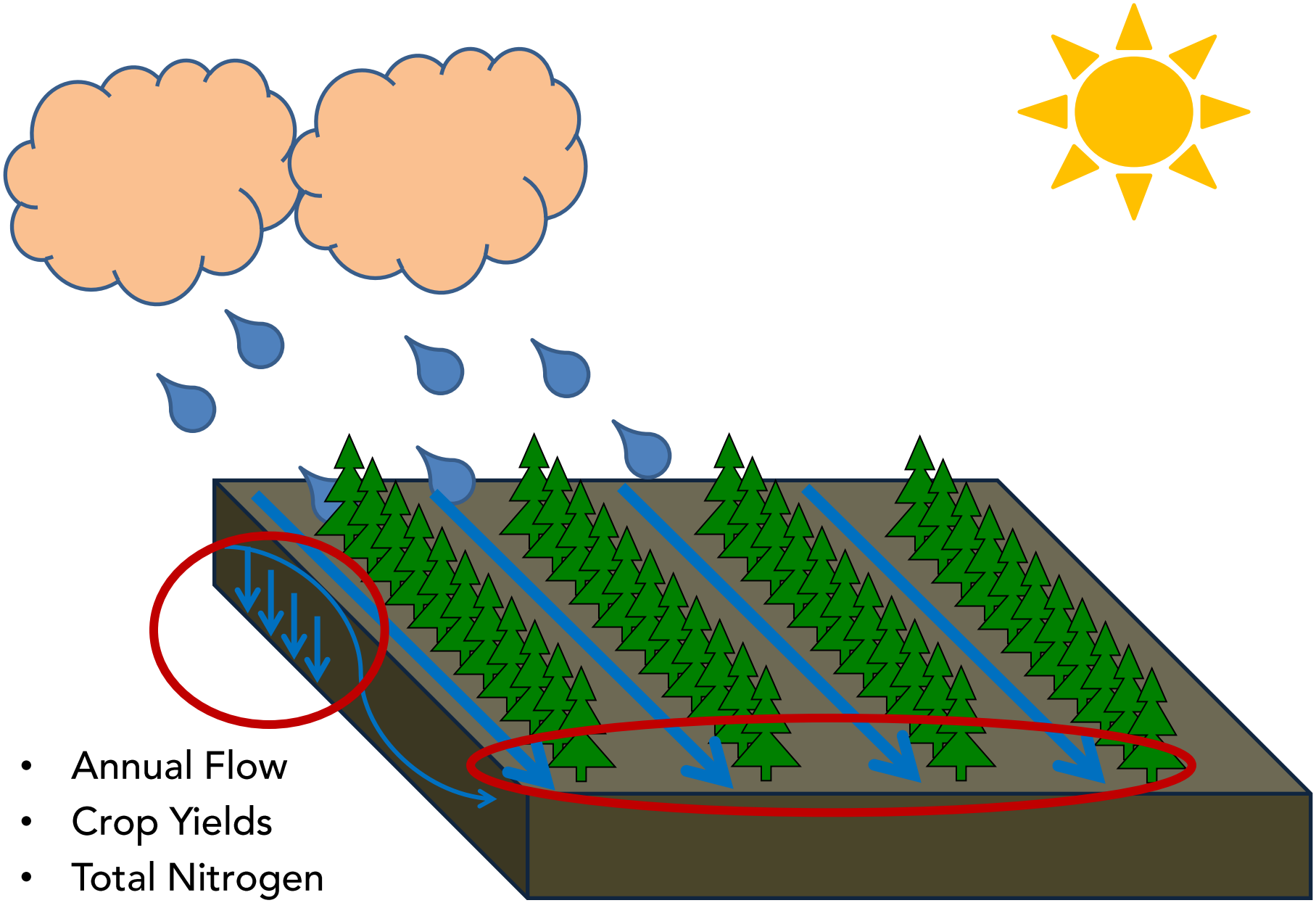
APEX outputs

- Surface runoff
- Groundwater runoff
- Crop yield
- Erosion
- Nutrient runoff

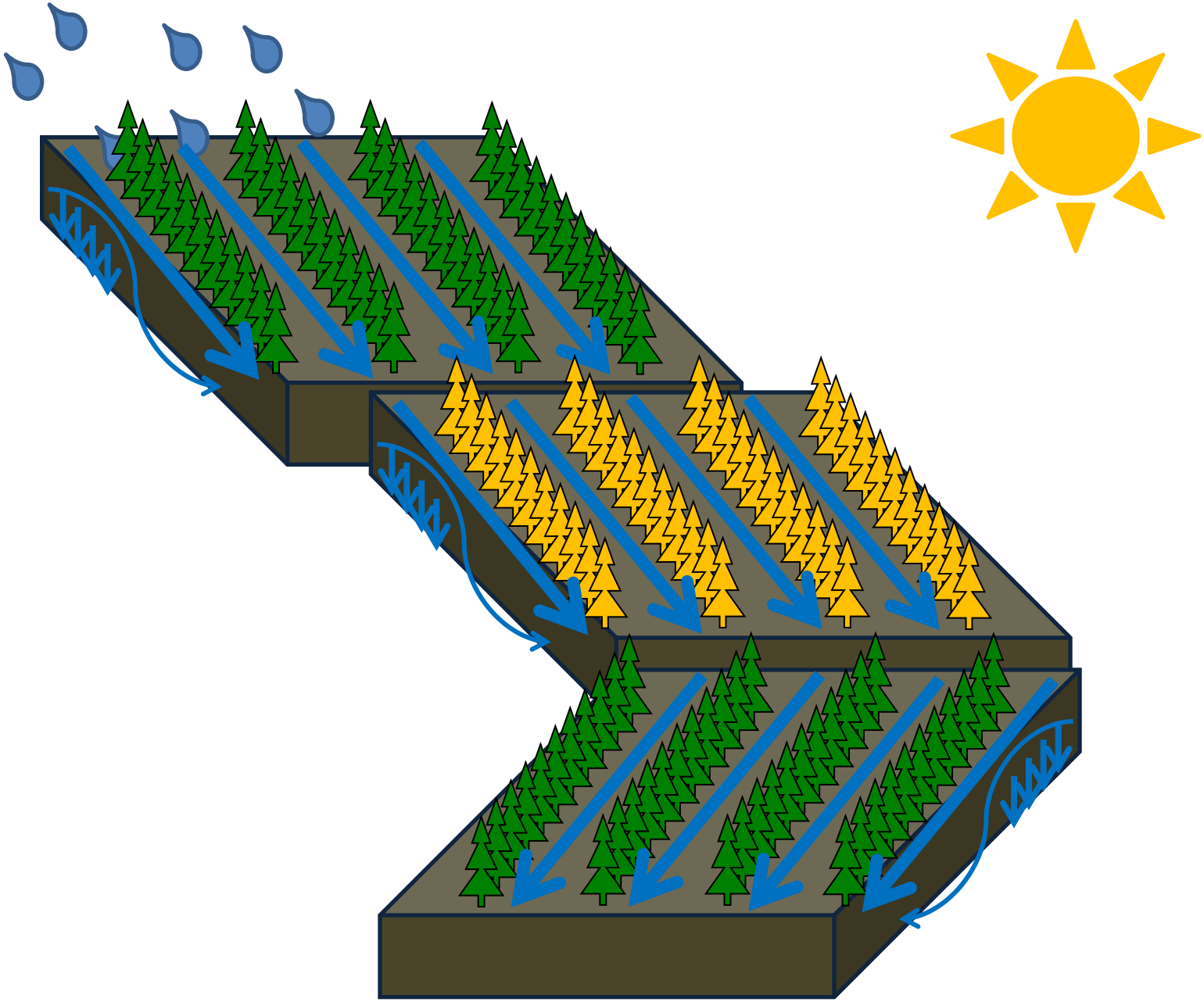

Willamette Silt Loam
3-7% Slope
Woodburn Silt Loam
3-7% Slope
Verboot Silty Clay Loam
3-7% Slope







- Annual Flow
- Crop Yields
- Total Nitrogen
- Total Phosphorus
- Sediment



Nutrient Tracking Tool

- Web-based interface for underlying APEX model
- Ideal for ag technicians

Getting APEX to work for the Southern Willamette

- Calibration – tuning the model using relevant input data and measured output data.

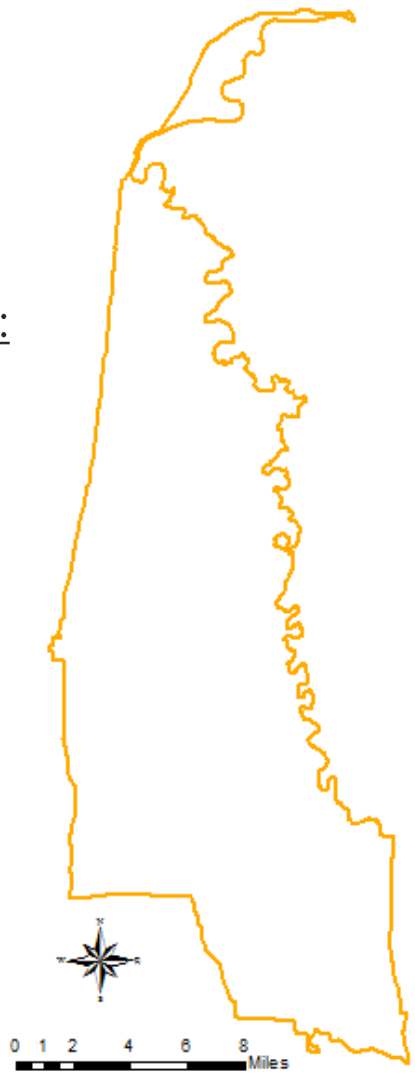
- Validation – testing the capabilities of the tuned model on new input data to determine accuracy against new measured data

List of Priority Crop Types

- Perennial grass seed
- Annual grass seed
- Winter wheat
- Sweet corn
- Green beans
- Peppermint
- Squash
- Radish or Beet seed

<u>Additional Potential Crops:</u>

- Broccoli
- Blueberry
- Red Beets
- Carrots



List of Potential BMPs

- Variable fertilizer application
- Variable irrigation practices
- Cover cropping vs. winter fallow
- BMPs used by farmers in historical studies

Questions?

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