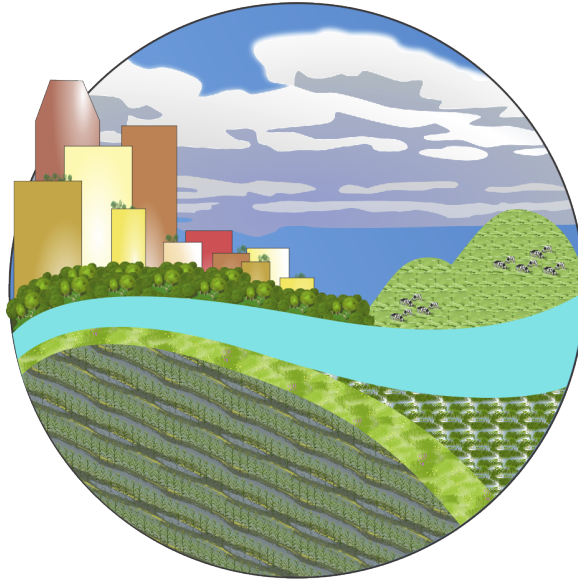


People in Ecosystems/Watershed Integration (PEWI)
General Level Index Notes



PEWI team

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Summary

This is the document of index. This document includes all descriptions for the general tab.

Acknowledgements

Special thanks to many people.

Contents

Summary	i
Acknowledgements	ii
1 Land Use	1
1.1 Conventional Corn	1
1.2 Conventional Soy	1
1.3 Conservation Corn	1
1.4 Conservation Soy	1
1.5 Alfalfa	1
1.6 Mixed Fruit and Vegetables	1
1.7 Grass Hay	2
1.8 Switchgrass	2
1.9 Permanent Pasture	2
1.10 Rotational Grazing	2
1.11 Wetland	2
1.12 Prairie	2
1.13 Conventional Forest	2
1.14 Conservation Forest	3
1.15 Short-Rotation Woody Bioenergy	3
2 Physical Features	4
2.1 Topographic Relief	4
2.2 Flood Frequency	4
2.3 Subwatershed Boundaries	4
2.4 Drainage Class	4
2.4.1 Hydrologic Group	4
2.5 Soil Class	4
2.6 Soil Texture	4
2.7 Corn Suitability Rating	4
3 Precipitation	5
4 Management Practices	6
5 Modules	7

1 Land Use

Fifteen land use types are available to choose from in PEWI, including perennial and annual legumes, annual grains, mixed fruit and vegetables, pasture, herbaceous perennials, and woody perennials.

1.1 Conventional Corn

Corn is an annual grain crop traditionally used for food, animal feed, and biofuel. Corn is currently the most planted field crop in the US, with over 36.4 million hectares (90 million acres) of corn planted every year[1]. In PEWI, conventional corn land cover assumes conventional tillage and management.

1.2 Conventional Soy

Soybeans are an annual nitrogen-fixing legume crop traditionally used for oil, animal feed, food, and industrial products. Soybeans are currently the second-most planted field crop in the US, with 31.4 million hectares (77.5 million acres) of soybeans planted every year[2]. In PEWI, conventional soybean land cover assumes conventional tillage and management.

1.3 Conservation Corn

Corn is an annual grain crop traditionally used for food, animal feed, and biofuel. Corn is currently the most planted field crop in the US, with over 36.4 million hectares (90 million acres) of corn planted every year[3]. In PEWI, conservation management assumes use of "no-till," cover crops, grassed waterways and/or buffers, as well as contouring and/or terracing where appropriate to the location (i.e. downhill slopes above 2% elevation grade).

1.4 Conservation Soy

Soybeans are an annual nitrogen-fixing legume crop traditionally used for oil, animal feed, food, and industrial products. Soybeans are currently the second-most planted field crop in the US, with 31.4 million hectares (77.5 million acres) of soybeans planted every year[4]. As legumes, they fix nitrogen (N₂) from the atmosphere, converting it into plant-available ammonia (NH₃). Conservation management assumes use of "no-till," cover crops, grassed waterways, and/or buffers, as well as contouring and/or terracing where appropriate to the location.

1.5 Alfalfa

Alfalfa is perennial legume traditionally hayed and used as forage for livestock. Approximately 7.3 million hectares (18 million acres) of alfalfa are harvested in the U.S. each year[5]. On average, three to five cuttings can be taken per year.

1.6 Mixed Fruit and Vegetables

The mixed fruit and vegetable land cover in PEWI is based on an equal distribution of four crops: strawberries, grapes, green beans, and squash. Mixed fruit and vegetable land cover in PEWI assumes effective management practices as noted by Taber.

1.7 Grass Hay

Grass hay is a perennial crop traditionally grown and baled for livestock feed. Over 15 million hectares (38 million acres) of hay, excluding alfalfa hay, are harvested annually in the United States. On average, three cuttings can be taken per year.

1.8 Switchgrass

Switchgrass is a native, herbaceous, low-input perennial crop that can be harvested for biofuel. It is adaptable to many soil types.

1.9 Permanent Pasture

Permanent pasture in PEWI is alfalfa or grass hay grazed by cattle for the typical 200 day grazing season from April 15 to November 1.[\[10\]](#)

1.10 Rotational Grazing

Rotational grazing is alfalfa or grass hay grazed by cattle for the typical 200 day grazing season from April 15 to November 1, strategically rotated across paddocks for even grazing.[\[11\]](#)

1.11 Wetland

Wetlands historically covered 89 million hectares (221 million acres) of what is now the contiguous United States.[\[12\]](#) Between the years 1780 and 1980, the states of Iowa, Missouri, Illinois, and Indiana underwent an 85 percent decrease of wetland acreage.[\[13\]](#) The native wetland ecosystem is a rich habitat for a diversity of organisms and provides many benefits through water filtration and retention, soil and nutrient retention, and carbon sequestration. Wetlands also hold potential as a venue for tourism, recreation, and hunting.[\[14\]](#) In PEWI, the benefits of restored wetlands are maximized by using Strategic Wetland areas.

1.12 Prairie

The Prairie land cover in PEWI consists of a diverse mix of tall grass prairie native to Iowa.[\[15\]](#) Less than 1 percent of the historical 97 million hectare (240 million acre) extent of tall grass prairie remains.[\[16\]](#) In Iowa, less than 0.1 percent of the original 12.1 million hectares (30 million acres) remain.[\[17\]](#) The native prairie ecosystem is a rich habitat for a diversity of organisms and provides many benefits through water filtration and retention, soil and nutrient retention, and carbon sequestration. Prairies also hold potential as a venue for tourism, recreation, and hunting.[\[18\]](#) Restored prairie may also be a source for valuable prairie seeds and native grasses for biomass.

1.13 Conventional Forest

PEWI conventional and conservation forest land covers assume appropriate tree species selection for each soil type. Information on specific tree species is available through the Iowa Woodland Suitability Composite.[\[19\]](#)

In practice, conventional forests are managed on an ad hoc basis. The forest is periodically clearcut or high-graded, in which the most valuable trees are removed. Strategy is not customized based on the historical composition or structure of forests in the area.[20].

1.14 Conservation Forest

PEWI conventional and conservation forest land covers assume appropriate tree species selection for each soil type. Information on specific tree species is available through the Iowa Woodland Suitability Composite.[21]

Conservation forest in PEWI assumes management with regard to historically relevant compositional and structural diversity using a variety of strategic techniques. These may include uneven-aged management including gap or patch cuts, even-aged management including shelterwood or crop tree release, and other techniques such as timber stand improvement, prescribed burning and/or tactical grazing, and removal of invasives.[22] It also assumes "management of coarse woody debris, mast-bearing trees, and sensitive areas such as riparian zones, ephemeral ponds, and rock outcrops." .[23]

1.15 Short-Rotation Woody Bioenergy

Short rotation woody crops are fast-growing trees, such as eucalyptus, poplar, and willow, grown for bioenergy and biofuel. In PEWI, aspen is used on a 10-year rotation.

2 Physical Features

In the Physical Features tab, you'll find information on topography, soil properties, subwatershed boundaries, and strategic wetland areas. These properties can help you strategize the placement of land uses. Physical features influence the Ecosystem Services gained from each land cover choice, from soil and water quality improvement to yield.

2.1 Topographic Relief

This feature shows the elevation grade, or slope, of each cell of PEWI. Land use covers perform differently under different elevations, and the topographic map can help explain results and inform location-specific land use choices. The lightest color represents the shallowest slope, and the darkest color represents the steepest slope.

2.2 Flood Frequency

This feature shows the frequency of flooding for each PEWI grid cell, as found in the Iowa Soil Properties and Interpretations Database (ISPAID) Soil Survey. Flooding categories are defined below, according to the ISPAID manual. In PEWI, flooding frequency is incorporated into yield calculations: yield is determined as per ISPAID calculations as a function of CSR2 results. The CSR2 formula is $CSR2 = S-M-W-F-D \pm EJ$, where F is the field condition including ponding and flooding properties, among other factors. See the Yield tab for more information.

- NONE = 0 = Flooding is not probable.
- RARE = 10 = Flooding is unlikely but possible under unusual weather conditions.
- OCCAS = 20 = Flooding occurs on an average of 50 times or less in 100 years.
- FREQ = 40 = Flooding occurs on an average of more than 50 times in 100 years.
- PONDED = 50 = Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration. (Ponded is for short duration unless otherwise specified).

2.3 Subwatershed Boundaries

2.4 Drainage Class

2.4.1 Hydrologic Group

2.5 Soil Class

2.6 Soil Texture

2.7 Corn Suitability Rating

3 Precipitation

Precipitation is based on historical annual precipitation data from Iowa to simulate climate variability. Scenarios are broken into three categories.

- The Dry category includes the 62.4 cm/yr (24.58 in/yr) scenario, with a probability of 5%, and the 71.6 cm/yr (28.18 in/yr) scenario, with a probability of 15%.
- The Normal category includes the 77.2 cm/yr (30.39 in/yr) scenario, with a probability of 15%, the 81.7 cm/yr (32.16 in/yr) scenario, with a probability of 15%, and the 87.2 cm/yr (34.34 in/yr) scenario, with a probability of 15%.
- The Wet category includes the 92.6 cm/yr (36.47 in/yr) scenario, with a probability of 15%, and the 114.6 cm/yr (45.1 in/yr) scenario, with a probability of 5%.

In PEWI, the level of precipitation influences water quality and soil quality metrics including nitrate and phosphorus runoff, gross erosion, and sediment transport. This is because improved water flow carries a greater quantity of soil and nutrients downstream. Extremes in precipitation also decrease yield for annual crops, mixed fruits and vegetables, alfalfa, grass hay, switchgrass, permanent pasture, and rotational grazing.[\[24\]](#) Calculations for yield for each land use can be found in the corresponding yield tab.

4 Management Practices

5 Modules

The scientific modules in PEWI display ecosystem service scores, the benefits that the watershed provides to people. PEWI tracks ecosystem services in four categories:

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