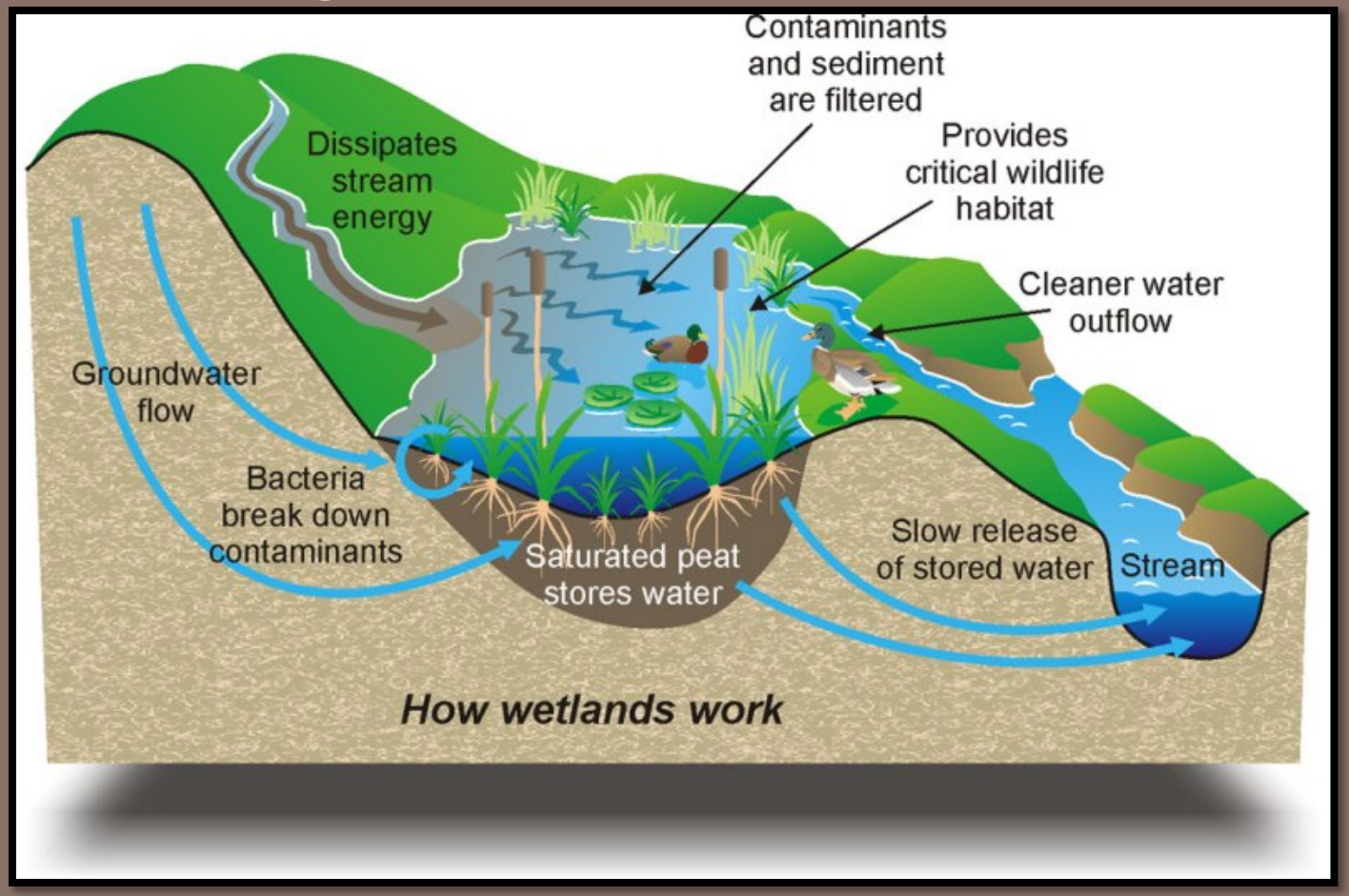
Solar Irrigation and Restoration



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Why Restore/Enhance/Construct a Wetland?

- Diverse ecosystems with hydric soil
- Wetlands act as biofilters for municipal and industrial
- Mitigate invasive species
- Environmental and educational tourist attractions.
- More cost-effective form of water treatment
- Low operation cost
- Sustainable due to solar power

Goals

- Employ a solar-powered irrigation system to remove contaminants from polluted water bodies.
- Use that water to irrigate degraded land.
- And restore, enhance and/or construct wetland and riparian habitat.
- Design a cost-effective, replicable, and mobile system.

The Fuss over Phosphorus

Phosphorous

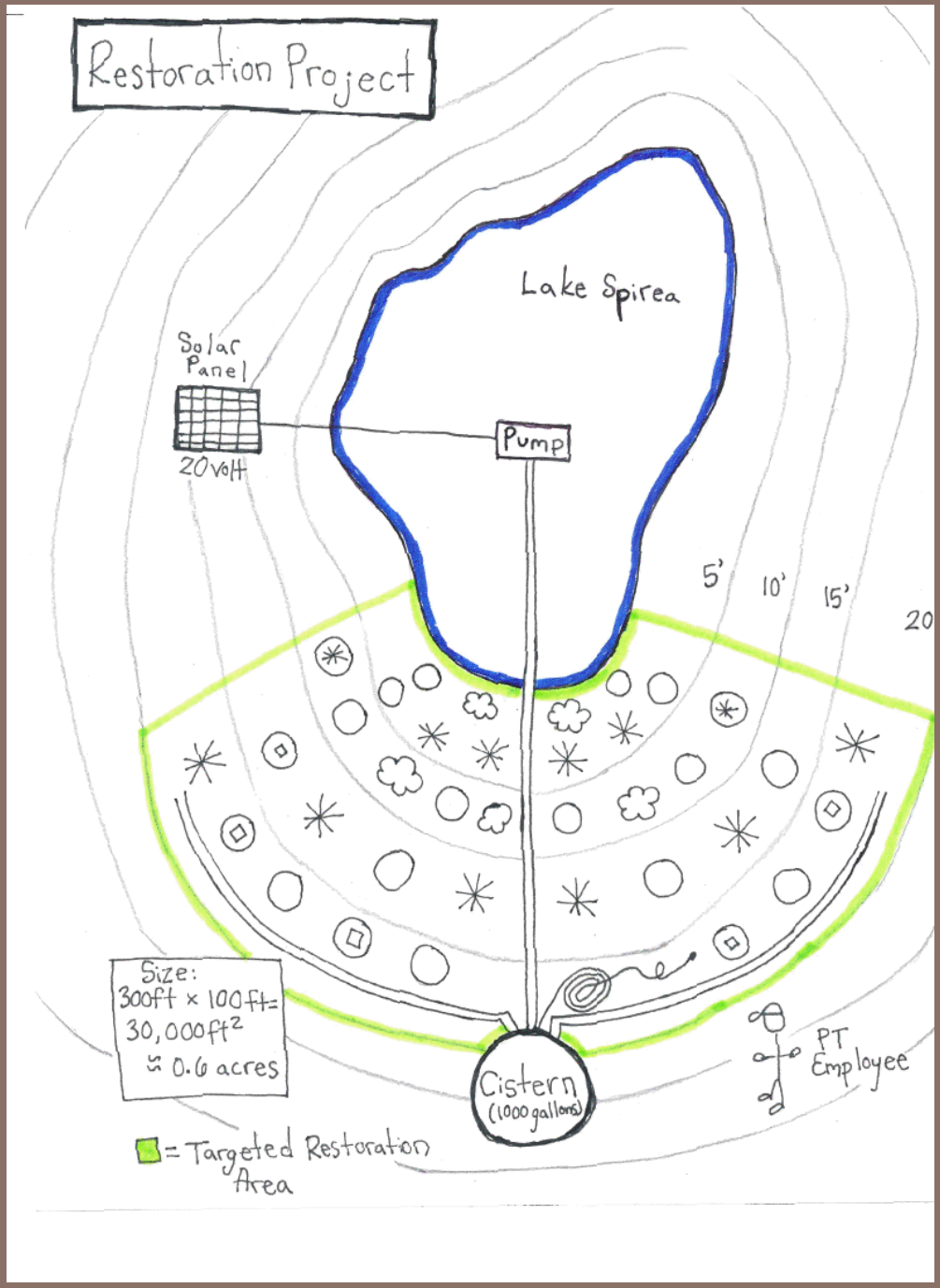
- Phosphorous is a macronutrient essential for plant growth.
- It is used extensively in fertilizer and other chemicals, so it often found in near areas of human activity.
- While phosphorous is essential to terrestrial plant growth, it is often a pollutant in freshwater ecosystems. Thus removing it from one system provides a necessary nutrient for the other.
- In freshwater, phosphorous is often a growth-limiting nutrient. If excessive amounts are added, aquatic plants and algae can proliferate. When they die, bacteria decompose them and use up the oxygen, leading to eutrophication.

Restoration

- Restoration at the Klamath Marsh National Wildlife refuge has demonstrated that successful willow planting requires specific environmental and plant conditions, including adequate and sustained soil moisture, before the cuttings will take root and survive beyond one year.
- Our system might aid in creating the right conditions necessary for this type of restoration.

A Bright Solution

- Water will be pumped powered by a solar panel from the polluted pond into a cistern. Up to 1000 gallons can be stored there.
- An employee will visit the site every other day and release the water. A special nozzle will enable her to manually water the site
- The restoration plants will soak up the nitrogen cleaning the water before it seeps back into the lake


Restoration Project
Lake Spirea
Solar Panel
20volt
Pump
5'
10'
15'
20
Size:
300ft x 100ft=
30,000ft²
≈ 0.6 acres
Cistern
(1000 gallons)
PT Employee
= Targeted Restoration Area

Let's Take a Tour

- Solar Power
- Pumping system
- Irrigation
- Native Plants

Solar Power

BP Solar SX 375J, Solar Panel, 75 Watt, 12 Volt

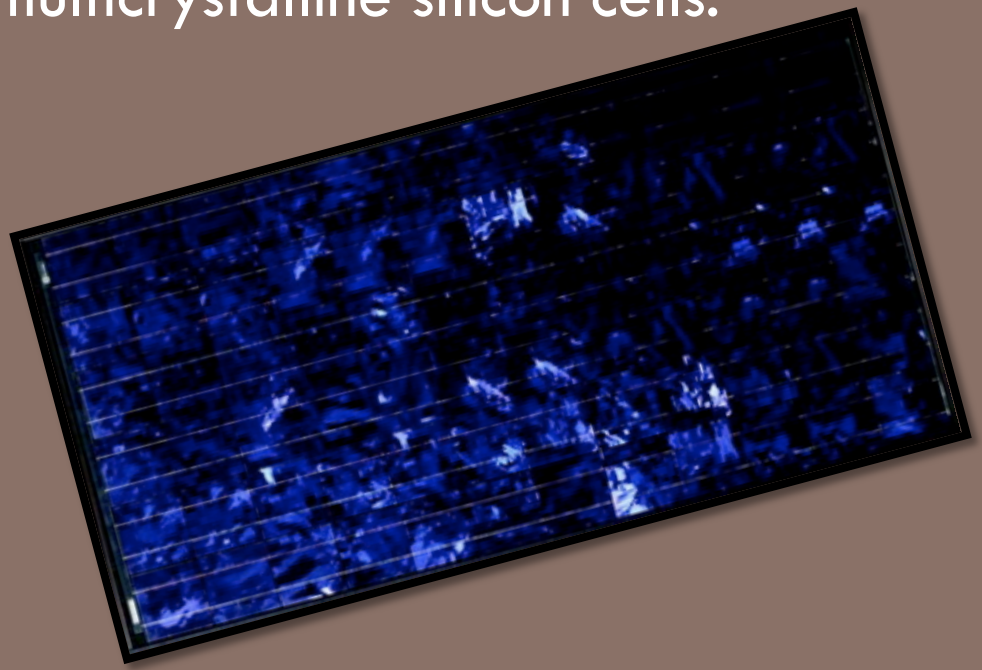
- Solar electric modules convert the sun's energy into direct current (DC) electricity. High-efficiency photovoltaic module using silicon nitride multicrystalline silicon cells.
- Performance

Rated Power: 75 watts

Power Tolerance: +-5%

Nominal Voltage: 12 volts

Warranty: 25 years



Pump- Shurflo the Sure Way to Go!

- Shurflo Model 9300
- Submersible
- Stainless steel inlet screen-perfect for filtering pond water
- Compatible with 24 Volt Solar Panel (DC)

Irrigation

- One 130’ long semi-fixable black plastic pipe going from pump uphill to cistern
- Irrigation ditches are simple and inexpensive
- Inspired by ancient agricultural irrigation systems
- Cistern holds water (up to 1000 gallons) until employee releases the water into the ditches or using house to manually water plants
- One hose to manually water

Native Plants

- Native plants provide shelter, food, and breeding areas for wildlife including invertebrates.
- They are adapted to our local climate requiring less maintenance
- Plants in our project: Western Red Cedar, Red Alde , Oregon Ash, Black Cottonwood, Western Spirea, Pacific Ninebark, Red-Osier Dogwood, Lady Fern, Willow, and sedge/ rush varieties.

Numbers

Calculations

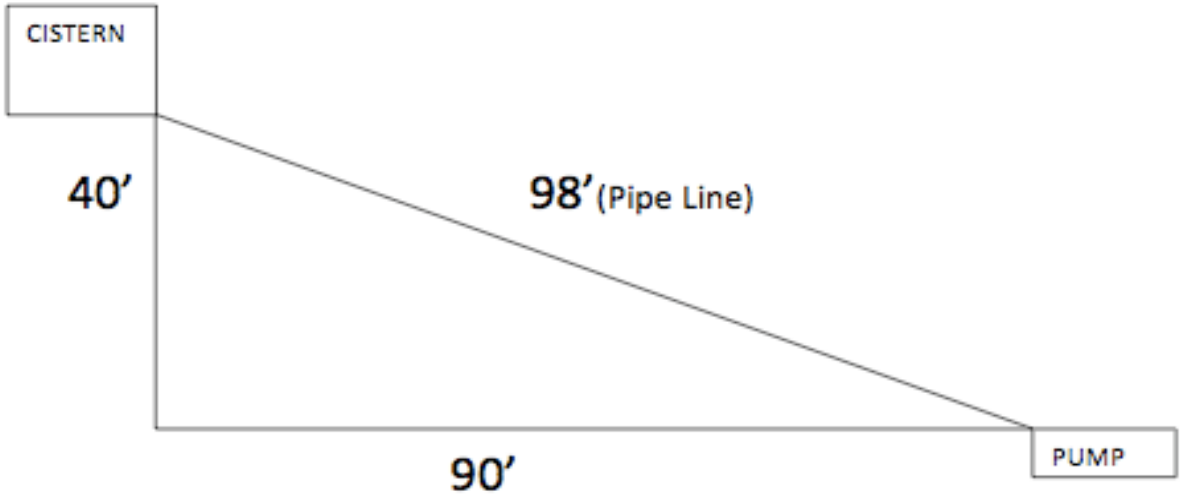
$$\text{Power of Panel (Wp)} = \frac{\text{Load (Wh)}}{\text{PSH (h) x combined efficiencies (\%)}}$$

Load = 100 watt hours

PSH≈ 5.5 hours

Combined efficiencies ≈ 85%

$$\text{Power of Panels (Wp)} = \frac{\text{160 watt hours}}{\text{5.5 hours x 85\%}} \approx 34.22 \text{ Wp}$$



Money Matters

- Shurflo 9300 submersible solar well pump 12-24vdc $619.00
- BP Solar SX 375J, Solar Panel, 75 Watt, 12 Volt$363.95
- Concrete (60 bags for a 4x4 and 8x8 pad) $400
- Fitting for PV Array (metal fitting, wood construction)
- Fitting for cistern (metal, wood construction)$300
- 130' of black flexible tubing (2x100' spools) $240
- 1000 gallon cistern $497.95
- Spigot fittings (hose) $50
- Shut off device $100
- Labor (concrete, initial setup)$200
- Intern Labor (daily activities)$900
- Waterproof electrical wiring (100' spool) $100
- Indigenous Plants (wetland) $400

TOTAL≈$4300

Simple, Affordable, Effective

- Clean up lake
- Improve water quality protection and enhancement
- Create wildlife habitat
- Groundwater recharge
- Keep non-natives at bay
- Create a natural park
- Created one more job
- Create educational opportunities
- System parts can be transferred to other projects

Room for Improvement

- Lake mineral build up
- Expensive
- Requires human presence
- Erosion?
- Non-native plants?

Similar Projects

- In 1999 the USFWS-ERO, USFS, and Deep Creek Ranch partnered on a project to establish riparian fencing and a solar-powered, off-stream watering project. The project was determined effective, and improvements to the riparian area were observed a few years later. Subsequently, however, allotment plans changed and the fences were removed due to lack of maintenance.

And Beyond!

- Other applications- clean up lakes w/ nitrogen or previously graveled mined areas
- Create opportunities for ecotourism
- Grow crops for food instead of creating an artificial wetland

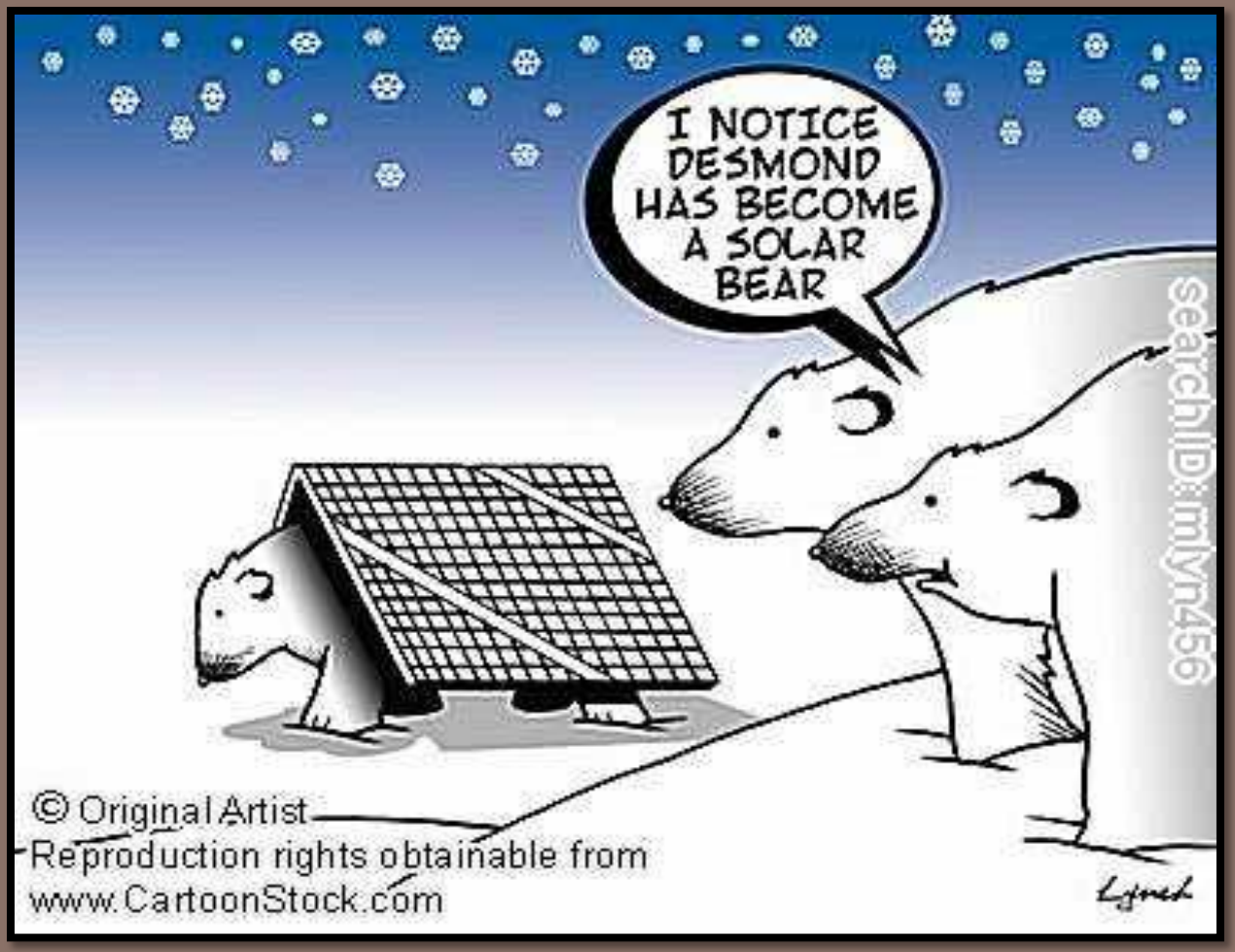
Climate Change

- Carbon sink
- Stores and regulates water

Resources

- Green Empowerment www.greenempowerment.org
- Oregon Wildlife Explorer http://oe.oregonexplorer.info/Wildlife/index.aspx
- Native Plant Society of Oregon www.npsoregon.org/
- Hillsboro Pipe & Supply www.hpspipe.com/
- http://www.ecodirect.com/
- http://www.plastic-mart.com/

Questions??????


I NOTICE DESMOND HAS BECOME A SOLAR BEAR
searchID:mlyn456
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