



Fire and Forestry in Oxbow Regional Park, GIS and GPS Implementation

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**GIS and GPS implementation at Oxbow Regional
Park, Oregon, in the preparation for fire danger and
the capabilities and protection offered by standard
fire suppression devices.**

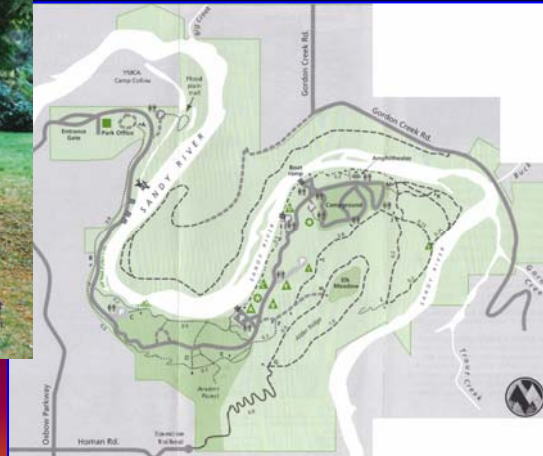
Research Question:

Is Oxbow Regional Park in East County prepared for a possible
fire danger, and what the current fire suppression equipment
available can protect in the park, and what areas need
protection?

Our Goals:

- To be able to create a map showing the coverage area provided by Oxbow's hose, and the coverage area provided by one single fire engine in response to a fire, and to show what areas of the park is lacking in protection in relation to fire hydrants and make recommendations for the locations of future hydrants.

Quick Info on Oxbow Regional Park



The Fire Hazards of Oxbow Park:

- Many campers enjoy this park and is usually at full capacity during summer weekends.



The campgrounds and group campgrounds have fire pits and barbeque pits. Group picnic areas also have barbeque pits. Illegal campgrounds abound on the eastern areas, and fires are built. Accidents can happen and if unchecked, the results can be disastrous.

Proposal Problems to Assess Within Oxbow Regional Park

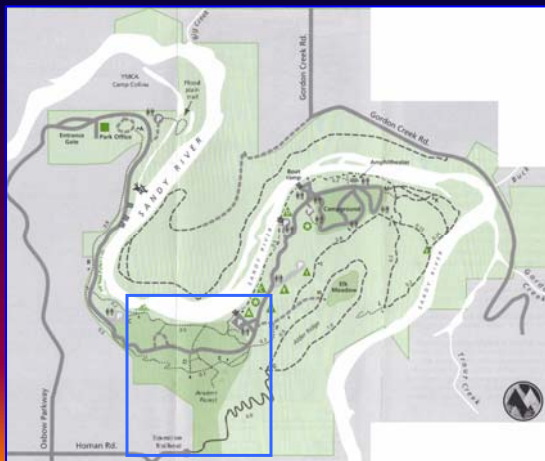
- Problem 1: No plan for disaster management.
- Problem 2: Protection of Old Growth Forest areas from fire danger
- Problem 3: Protection of occupants of park when at risk during fire danger.

: Problem 1: No plan for disaster management.

- If there is a fire within the old growth forest, how do the campers get out??
- Needs to have disaster management plan in force and displayed for reference for campers and park users.



Problem 2: Protection of Old Growth Forest areas from fire danger



- Need to make sure that all available access to the Old Growth can support a fire suppression team and/or vehicle to offer better fire protection. According to park sources, there is an immense amount of fuel built up in the forest and is very ripe for a fire.

Problem 3: Protection of occupants of park when at risk during fire danger.

An advance warning system and posted fire evacuation plan at many points in the park can give awareness to the safety of the users.

Put in conjunction with the disaster management plan.



Oxbow's Response to Fire?!?

- Oxbow's Maintenance shed located at the entrance to the park has ONE hose which is 700 feet of 1.5 inch hose.



Fire Response:



- Gresham Fire Station 76, Closest Responders
- Basic information on any standard fire engine responding to fire at Oxbow Park
 - An engine/pumper can be connected to a single hydrant up to 1000 feet away. In Oxbow's case, needs to stay on the roadways due to weight of pumper.
 - It can distribute hoses up to 700 feet from the pumper in any accessible direction.
 - Our basis for the analysis of areas protected and unprotected

Methods

- 1: Clipped street and river layers to park boundary layer
 - Clipped streets to boundary (oxbow_streets)
 - Clipped rivers to boundary (oxbow_river)
- 2: Calculated distance along road (1000ft.) from each hydrant
 - Oxbow Park road is 125965 ft. long
 - Measure tool: length is shown on the status bar, to set display units, open data frame properties in View menu, -general tab. Display units can be set independently of map units.)
- 3: Used above distances to locate positions of trucks at maximum distance from hydrants (1000ft.) Input points as x/y data.
- 4: created 700ft buffers around trucks
 - ArcToolbox- Analysis tools- Proximity- Buffer
- 5: Union of truck and hydrant buffers to create total buffer
- 6: Intersected streets within the union buffer to eliminate the part of the road not covered by the buffer. This identified the section not covered by the buffer.

Methods *(cont.)*

- 7. Uncovered segment is 2096 ft., using measure tool
- 8. Add fire hydrant at 1048 ft. (middle of segment) which would cover segment.
- 9. created coordinate points (lat/long) to add future hydrant, in excel, x/y data, shapefile.
- 10. Created 1000ft buffer around new hydrant to find max distance from hydrant to truck
- 11. Created 700ft buffer around future truck locations
- 12. Union of these buffers shows that if future hydrants are installed, all areas along the road are covered by fire truck.

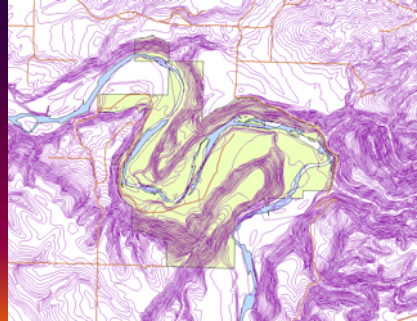
Base Maps



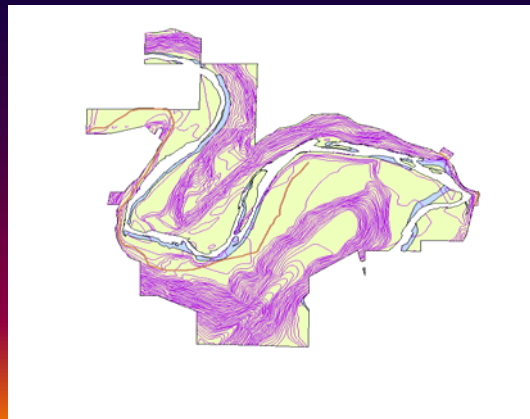
Topographical and Aerial Photo provided by Terraserver, these maps are coordinated, making them easy to place with other maps, and were downloaded as base maps.

Other Data used in Project:

- RLIS shapefiles from Metro
 - Parks
 - Streets
 - Rivers
 - Contours
 - Slope



Clipped Layers to Park Boundary

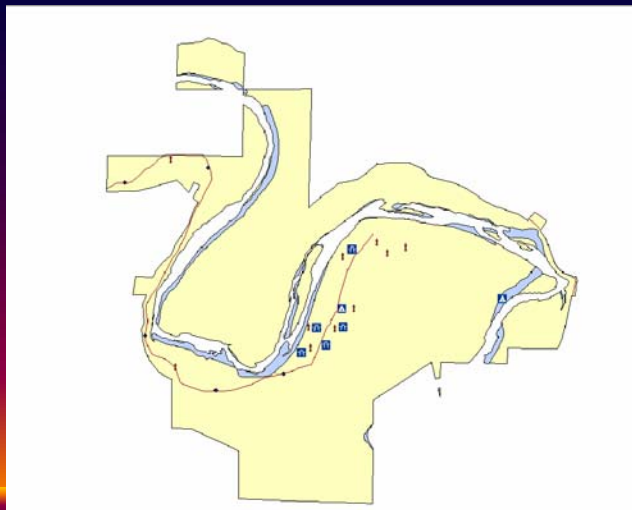




Collection of Data with GPS

- Using a GPS will allow us to determine the location of fire hydrants in Oxbow Park, as there is no record, except in the Park Rangers "mind."
- One problem, the steep sides of the canyon walls surrounding the Sandy River and Oxbow park, and the extensive tree canopy prevented accurate information gathering with a GPS unit.
- Forced to take measurements from landmarks in specific directions to each hydrant.
- Apply these directions to our map, logging in the coordinate information, adding the points as x-y data with latitude and longitude coordinates in a excel table, then exported to a shapefile within ArcCatalog, creating points in ArcGIS.

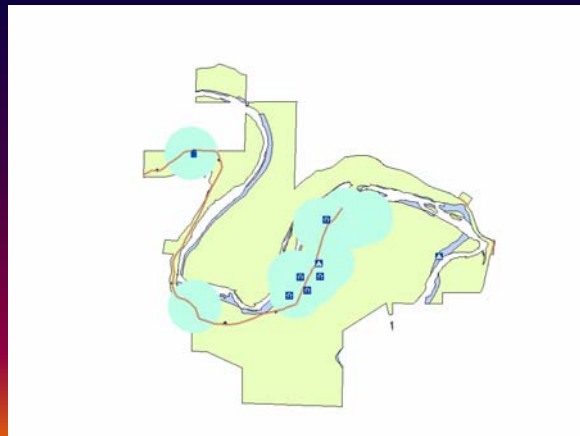
The results of manually entering coordinate information for pertinent locations, and creating point layers for use in this project.



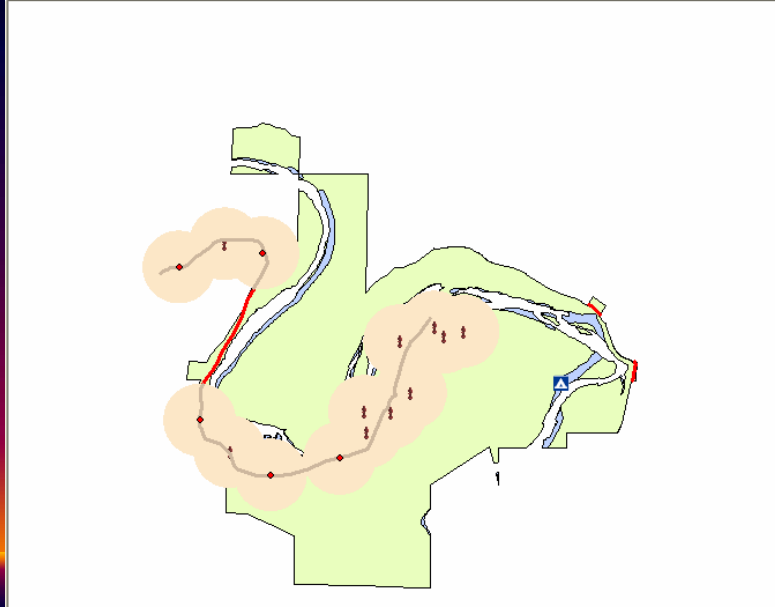
A basic map showing the park boundaries, the river, locations of hydrants, related park features, roads, and a hillshade showing the dramatic terrain changes of the Sandy River Canyon.



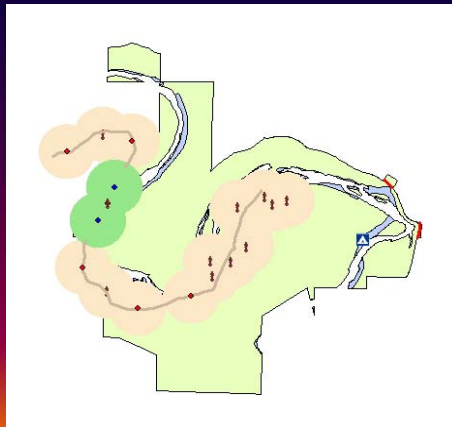
Buffer Zones around each hydrant to show coverage by Oxbow's 700ft hose, if used.



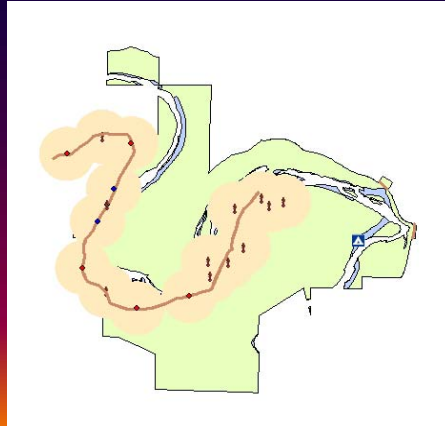
Fire Truck Coverage (Buffer)



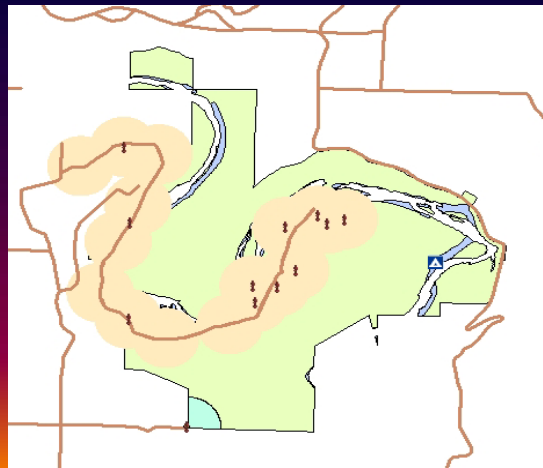
Buffer Map showing recommended locations of new hydrants along the road for better fire truck coverage.



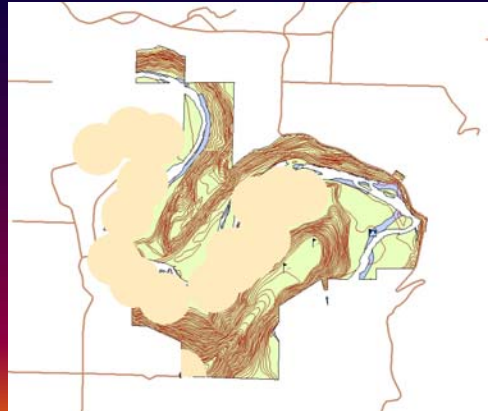
It would be ideal to have all the areas along the roadways that are accessible by fire truck have fire protection by a fire truck also, as shown in this buffer map showing an ideal zone of protection along the roadways.



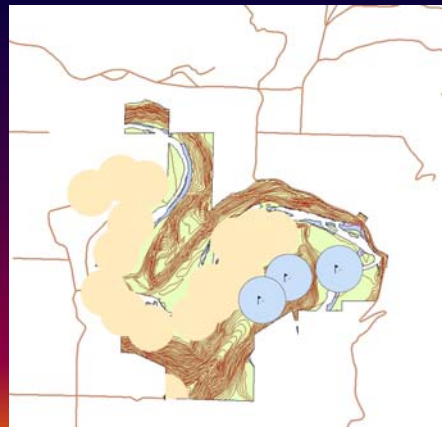
Map showing ideal location for another hydrant, this is located at an equestrian trailhead, which has enough space for a fire truck.



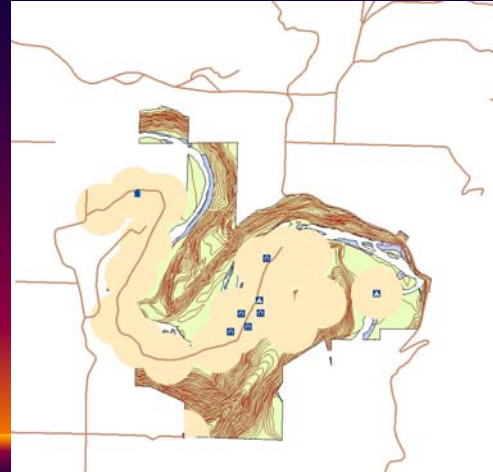
Locations for future fire hydrants with permanent hose, indicated by flags on map.



Buffers around future hydrants at 700ft. This gives the capability of offering the fire suppression 24/7 by anybody.



Final map with complete coverage of new hydrants and hoses. Vast improvement of fire suppression over current locations.



Conclusions:

The park can benefit from many upgrades to better offer protection to its many natural areas and to protect those that come to visit the park.



A disaster management plan is one of the best steps the park can do to begin planning for better fire protection, as the plan can outline what is important and how to best protect that item. For example, the importance of the gaps in the old growth forest coverage may show a hydrant placement to be the best solution. If space and terrain is not an issue, a access road can be built in certain areas for a smaller wild land firefighting vehicle that has capabilities to traverse terrain and carry its own water supply. The best plan for Oxbow Regional Park is to have a plan first.



Thank You!