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Prepared in cooperation with the Bureau of Land Management

Development of an Interactive Shoreline Management Tool Phase II: GIS Graphical User Interface

Example Implementation: Wetlands Adjacent to Upper Klamath Lake

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The Wood River Valley, with the Wood River Wetland and Agency Lake in the foreground.
Photograph by Trisha Roninger, U.S. Fish & Wildlife Service

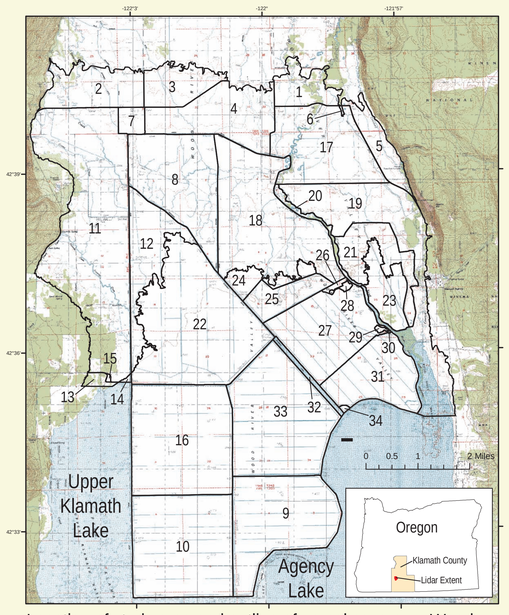
Introduction

Former shoreline wetlands that have been cut off by dikes along the northern margins of Upper Klamath and Agency Lakes near the inlet of the Wood River might in the future be reconnected to the lakes by breaching the dikes. Issues of interest associated with restoring wetlands in this way include the area that will be inundated, the volume of water that may be stored, the change in wetland habitat including water depth, and the variation in these characteristics as surface-water stage is changed.

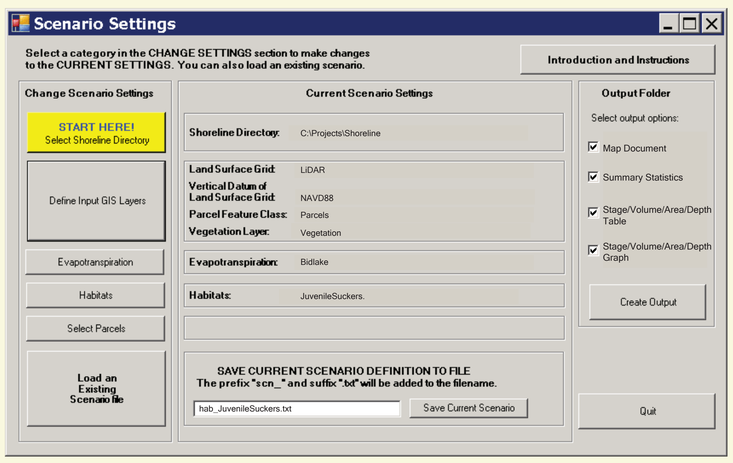
Phase I of a recent study, conducted by the U.S. Geological Survey in cooperation with the Bureau of Land Management, developed GIS maps of inundation and tables for water volume and area for various surface-water stages for wetland parcels extending to the approximate former northern margins of Upper Klamath and Agency Lakes (Haluska and Snyder, 2007). The analyses utilized detailed land-surface elevation derived from Light Detection and Ranging (LiDAR) data recently collected in the lower Wood River Valley.

In Phase II, a new GIS-based graphical user interface is being developed for use in ArcMap to provide greater ease of access to this information. Resource managers with little GIS experience will now be able to analyze the data previously compiled in Phase I and develop their own inundation scenarios and receive relevant information pertaining to the resulting location, volume, area, and depth of inundation. Products from this analysis can assist water managers in assessing the effect of breaching dikes and understanding changes to water storage and ecological habitat with changing surface-water stage in an area with water shortages and endangered or threatened species.

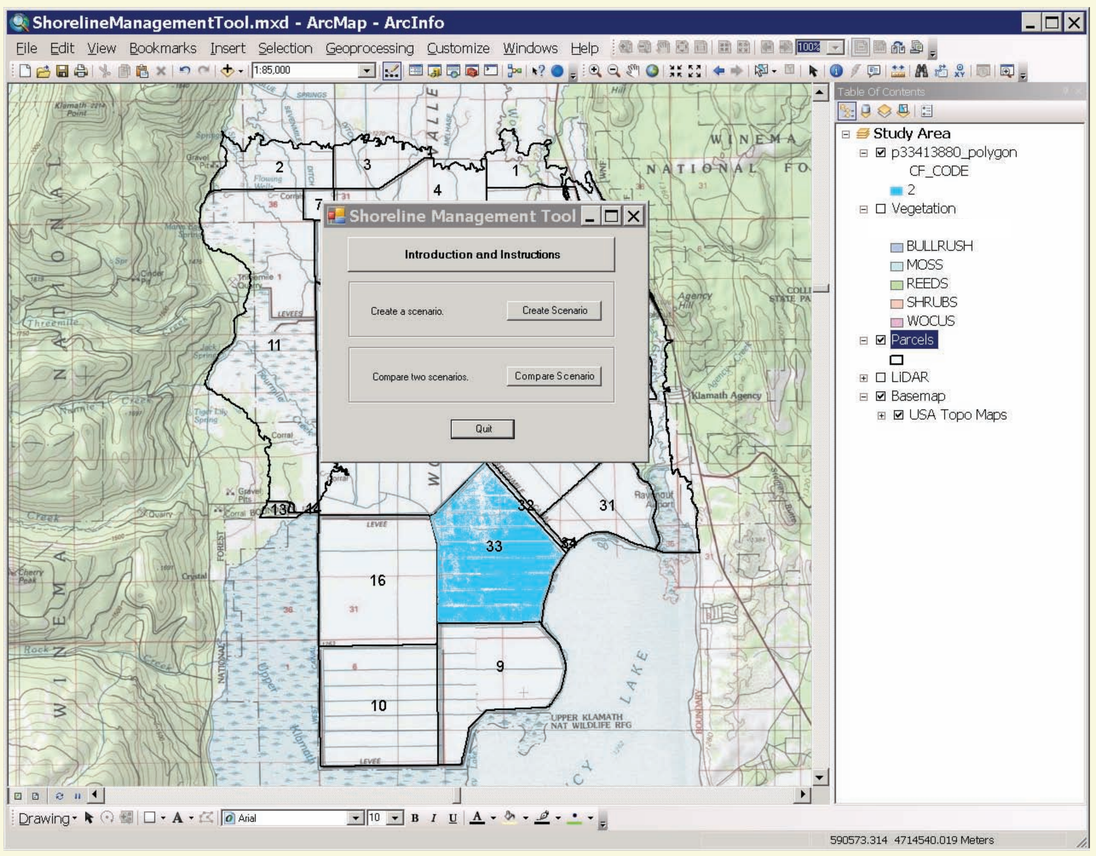
The new user interface is designed to be highly transferrable for use in other areas providing that suitable input data are previously available such as a digital elevation model, land parcel delineations, and stage-volume/stage-area relations.



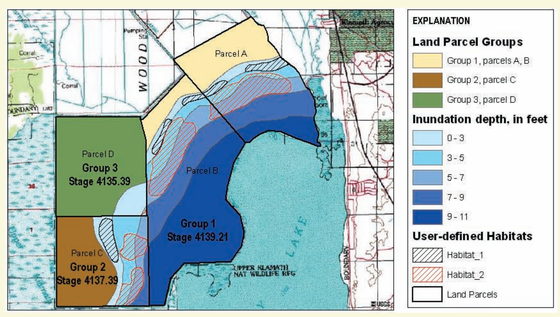
Location of study area and outline of parcel coverage, Wood River Valley, OR, adjacent to Upper Klamath and Agency Lakes.



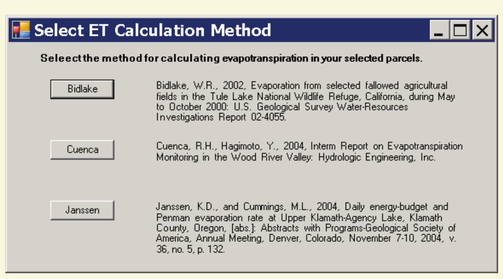
The Scenario Settings form allows users to choose input datasets, evapotranspiration calculation method, habitat definitions, and parcels that will participate in the analysis. Additionally, users may choose which output products they wish to see.



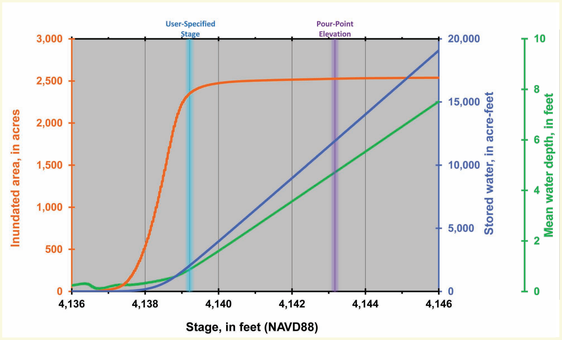
ArcMap version 10 supports Microsoft Addin controls on which the Shoreline Management Tool is built. The addin is developed in Visual Studio using Visual Basic in the .NET environment. The graphic above shows ArcMap and the initial form of the Shoreline Management Tool. Parcel 33 has been inundated to lake stage of 4138.80 feet NAVD88 (North American Vertical Datum 1988).



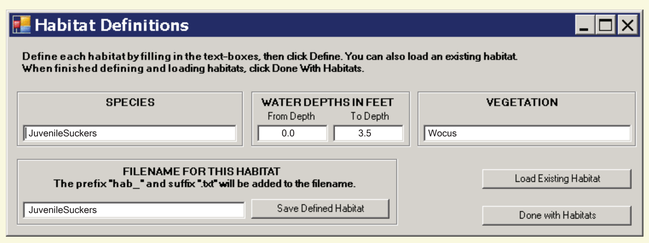
Output products will include potential habitat areas as identified by the user. Users can select individual parcels or groups of parcels.



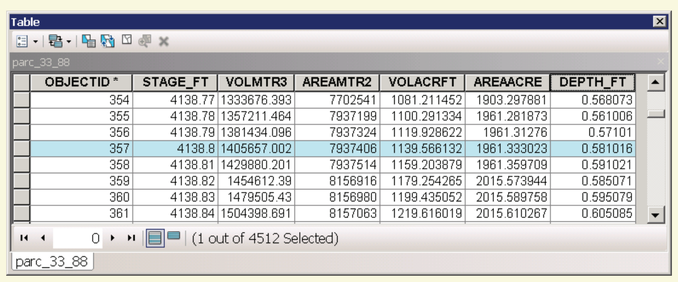
The Select ET Calculation Method form allows users to choose the method with which evapotranspiration is calculated.



The graph above shows the stage, volume, area, and depth relationship for parcel 33. The graph illustrates the increase in stored volume of water and water depth with increasing surface-water stage and the large increase in inundated area between stages of 4,137 and 4,139 ft. The inundated area increases rapidly because the land surface is relatively flat. In the example, as the inundated area approaches the area of the parcel, 2,544 acres, the rate of increase in inundated area with stage becomes nearly flat. However, although the inundated area is unchanged after the parcel is submerged, the stored volume continues to increase because the depth of water continues to increase. The pour point is the lowest land-surface elevation along the perimeter of the parcel. This is the elevation at which water would begin to pour over the retaining dikes unless modified



The Habitat Definitions form allows users to define areas of interest for specific habitats they want to identify. Users will provide the vegetation layer and specify a depth range for each habitat definition and the tool will identify these potential habitats.



Table

parc_33_88

OBJECTID *	STAGE_FT	VOLMTR3	AREAMTR2	VOLACRFT	AREAACRE	DEPTH_FT
354	4138.77	1333676.393	7702541	1081.211452	1903.297881	0.568073
355	4138.78	1357211.464	7937199	1100.291334	1961.281873	0.561006
356	4138.79	1381434.096	7937324	1119.928622	1961.31276	0.57101
357	4138.8	1405857.002	7937406	1139.566132	1961.333023	0.581016
358	4138.81	1429880.201	7937514	1159.203879	1961.359709	0.591021
359	4138.82	1454612.39	8156916	1179.254265	2015.573944	0.585071
360	4138.83	1479505.43	8156980	1199.435052	2015.589758	0.595079
361	4138.84	1504398.691	8157063	1219.616019	2015.610267	0.605085

0 (1 out of 4512 Selected)

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Pre-processed data tables containing stage-area-volume-depth relations will be displayed for each parcel participating in the analysis.

Download report at: http://pubs.usgs.gov/of/2007/1364
(Link to data is in the report)

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