



University of Wisconsin  
Eau Claire

# Geospatial Investigation of Fort Ord Dunes State Park: Cultural and Physical Background

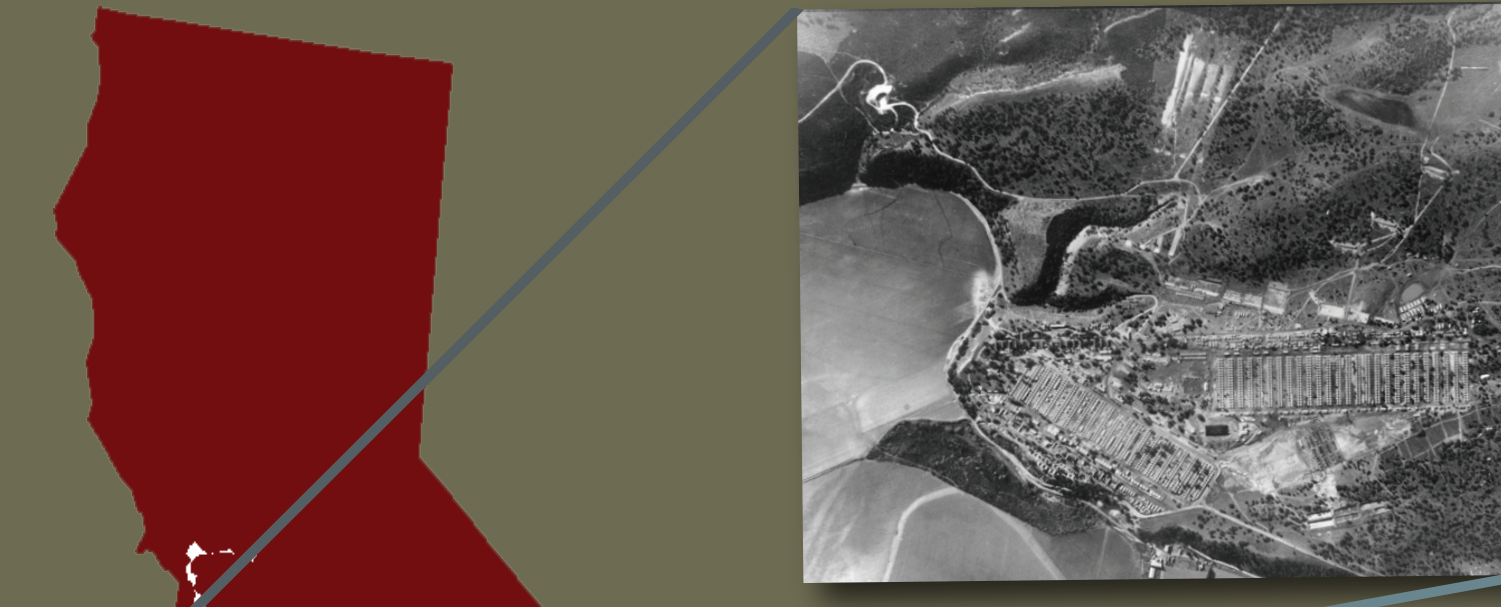
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uwec.edu/joIhm/desertsouthwest/days.html



Ft. Ord Dunes State Park

## Abstract

The Fort Ord military training facility in Monterey Bay, California was closed in 1994. A 6.4km section within the former base was designated as Fort Ord Dunes State Park in 2009. The focus of the study was to investigate the internal stratigraphy of the coastal dune complex and the cultural impacts of the abandoned military base. Field observations of a 48m thick eroding coastal outcrop showed three sedimentary dune packages. The three packages were separated by two erosional unconformities measured at depths of 18.75m and 30.25m each topped with a buried soil horizon. The coastal dune complex was embedded with twelve abandoned ammunition military bunkers. Using a global positioning system (Trimble Juno 3B), the observed average length (15.2m) and average width (3.3m) of the bunkers were recorded. A 200m transect across the apex of the dune complex revealed ice plant (*Carpobrotus edulis*) which covered 86.3% of the dunes. Ice plant is a non-native species that was planted by the military during the 1940's to stabilize the dunes and has become invasive, outcompeting native vegetation. The geospatial investigation provides insight into the physical and cultural landscape of Fort Ord Dunes State Park which will aid in the park's continued development.



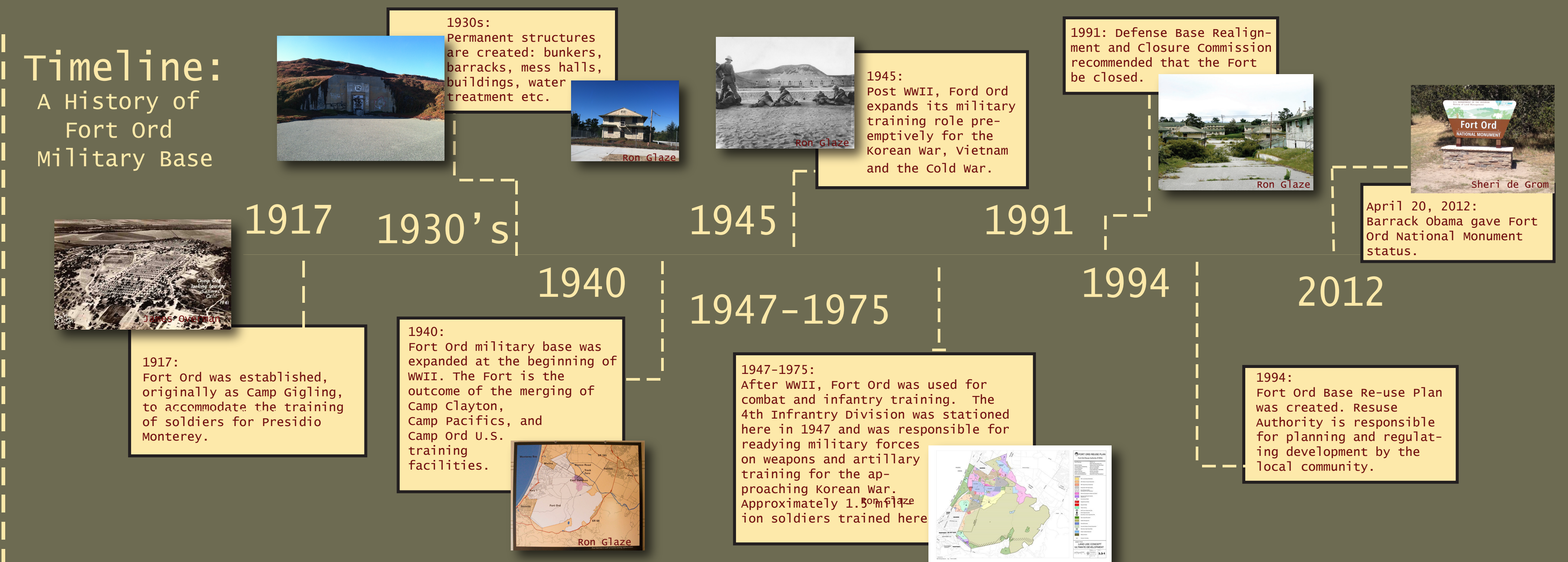
Ft. Ord Military Training Facility

Monterey Bay, California

36° 38' 21" N  
121° 44' 7" W

## Background

### Timeline: A History of Fort Ord Military Base



Fort Ord Dunes State Park encompasses 4 square km of beachfront backed by a coastal dune complex overlooking Monterey Bay, California. The park was originally part of a larger area which included the Fort Ord military base. The timeline above depicts the history behind the former military base and current park.

## Methods and Field Observations

Sediment in dune formations is typically carried along the windward side of the dune and across to the apex where the load of sediment eventually reaches a brink point. Once an overload occurs from the accumulation of sediment an avalanche ensues down the lee of the dune. Field observations of a 48m thick eroding coastal outcrop showed three sedimentary dune packages observed in Figure 1 & 3. The three packages were separated by two erosional unconformities measured at depths of 18.75m and 30.25m each topped with a buried soil horizon.



Figure 1: Exposed coastal outcrop with 3 sedimentary packages.

Due to the northwest direction of the winds during the Holocene as evidenced by both relict and active dune orientation sediment structure is mixed. Low velocity winds during the Holocene period created dunes that dip slightly to the windward side and are understood to be accretionary strata. Accretion is the process by which a layer of sediment is added to a previously existing sedimentary structure by deposition carried by wind. An asymmetrical ridge of sand spreading transverse to the direction of the northwest winds is evidence that the Holocene also experienced periods of high velocity winds. A transverse dune has a slight windward slope.



Figure 2: Embedded ammunition bunker

The coastal dune complex was embedded with twelve abandoned ammunition bunkers, see Figure 2, placed by the military prior to World War II. The bunkers are a representation of a cultural aspect that transformed a portion of the physical features of the dune complex. The bunkers add to the historical interest that the park inherited by the occupation of the military.



Figure 3: Class measurements of coastal outcrop with 3 sedimentary packages.

Using a global positioning system (Trimble Juno3B), the observed average length (15.2m) and average width (3.3m) of the bunkers were recorded. Additionally each bunker location was mapped based on the GPS coordinates recorded and placed within the aerial map as seen in Figure 4.



Figure 4: Bunker Locations at Fort Ord Dunes State Park

The vegetation along the 200m transect line was mapped as observed in Figure 5. The vegetation survey revealed ice plant (*Carpobrotus edulis*), see Figure 6., intermixed with European dune grass (*Ammophila*) and some native vegetation. Ice plant is edging out the native vegetation as it has become extremely invasive. There is a restoration plan in place designed to slowly incorporate more of the native vegetation back into the dune complex.

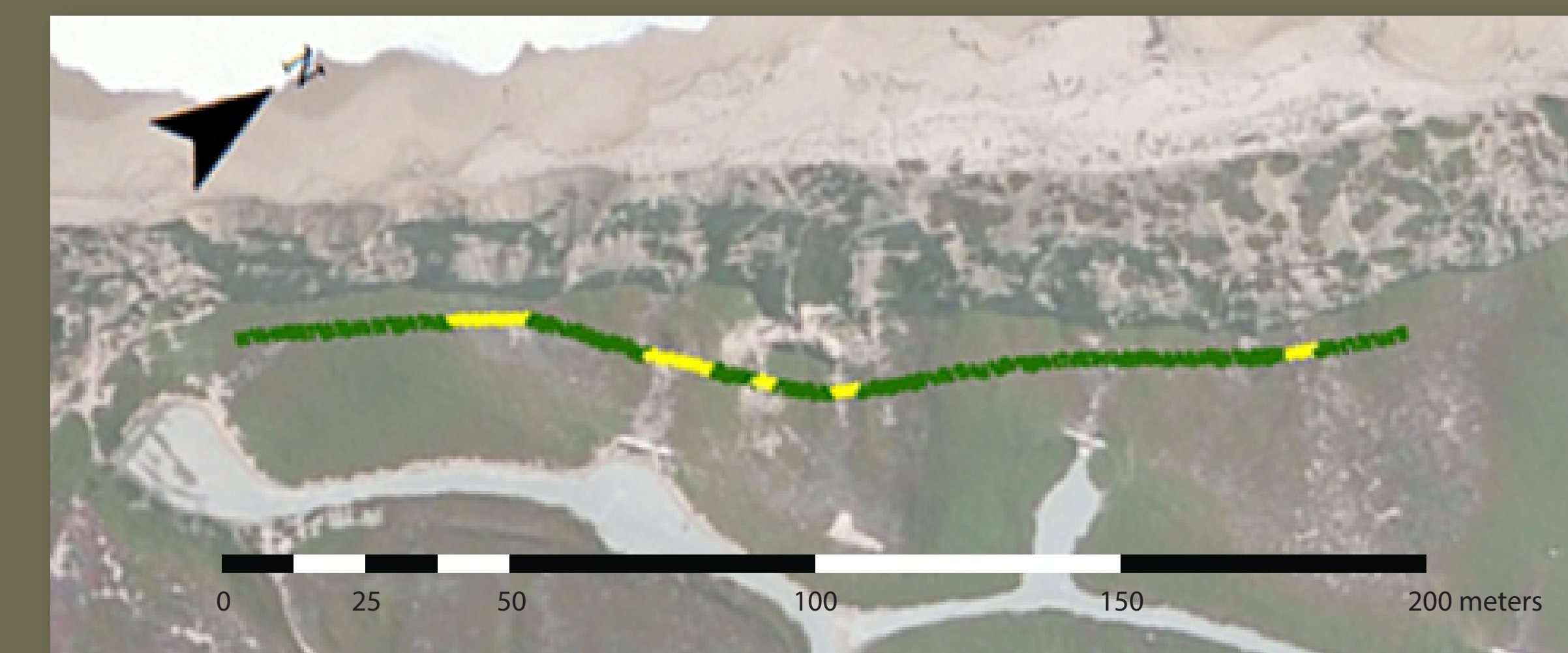


Figure 5: 200m Vegetation Transect- Ice plant was present 86.3% of the transect which demonstrates the invasiveness of the species.



Figure 6: Ice Plant (*Carpobrotus edulis*) is an exotic species planted by the military to help stabilize the dunes. It has taken over the native vegetation.

## Conclusions

The history of Fort Ord is fundamental to understanding the cultural and physical landscape. By combining visual field observations with GPS and GPR collection, our study revealed the location of the abandoned military bunkers and the effect their construction has had on the dune fields. Our information will enable the bunkers to be mapped and may be of use to the Fort Ord Re-Use Authority.

## Acknowledgements

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