Do Native American kitchen (midden) sites influence the cover of introduced species?

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Introduction:

Forms of land use that deviate from historic and natural patterns often change the original vegetation composition. Plants which evolved under the original conditions may face new selection pressures to which they are not adapted. In grasslands where native species compete with introduced species for resources, human land use frequently decreases both diversity and cover of native species. Two major mechanisms probably responsible for this change are elevation of nutrients and disturbance. One largely unanswered question is how long the effects of past human disturbance on invasion may persist. This is of ecological importance as the new vegetation composition may be vulnerable to otherwise infrequent natural disasters and disturbances.

Case study

Historic land use by Miwok and Pomo kitchen sites occur along the introduced grasslands along the coast of central California, about 90-110 km north of San Francisco. They have been abandoned for more than 100 years.

Middens were used intensively for cooking over fires and as refuse areas for shells and food wastes, and were probably both highly disturbed and enriched for nutrients, but are now completely revegetated.

Predictions:

• Native American midden sites will have higher covers of introduced species than areas off middens.

• Inorganic nitrogen concentrations will be higher on middens and will positively affect the cover of introduced species.

Methods:

A survey of all recorded midden sites along the coast of Sonoma County, California, between Bodega Head and the Russian River yielded eight that were located in grassland. Five 50 x 50 cm plots were located on and six plots off each of these middens. In June-July 2007, cover of each plant species in each plot was estimated visually by classes and a soil sample collected for analysis of ammonium, nitrate, and water content. Statistical analyses were carried out in SYSTAT 11.0.

Cover (mean [SE]) of introduced annual grasses was more than twice as high on middens than off (P = 0.005). Native and introduced perennial grasses were marginally higher off middens than on (P = 0.064 and P = 0.079, respectively). Covers of native and introduced forbs did not differ on and off middens.

Conclusions:

• Results confirmed the prediction that cover of introduced plants species would be higher on than off middens.

• This was due to a higher cover of introduced annuals, especially grasses.

• Soil nitrogen availability was also higher on than off middens, and may be one mechanism for their persistent, positive effect on invasion.

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