

GUIDE to MARINE INVADERS in MONTEREY BAY

Undaria pinnatifida Asian kelp, wakame seaweed



PHYSICAL DESCRIPTION

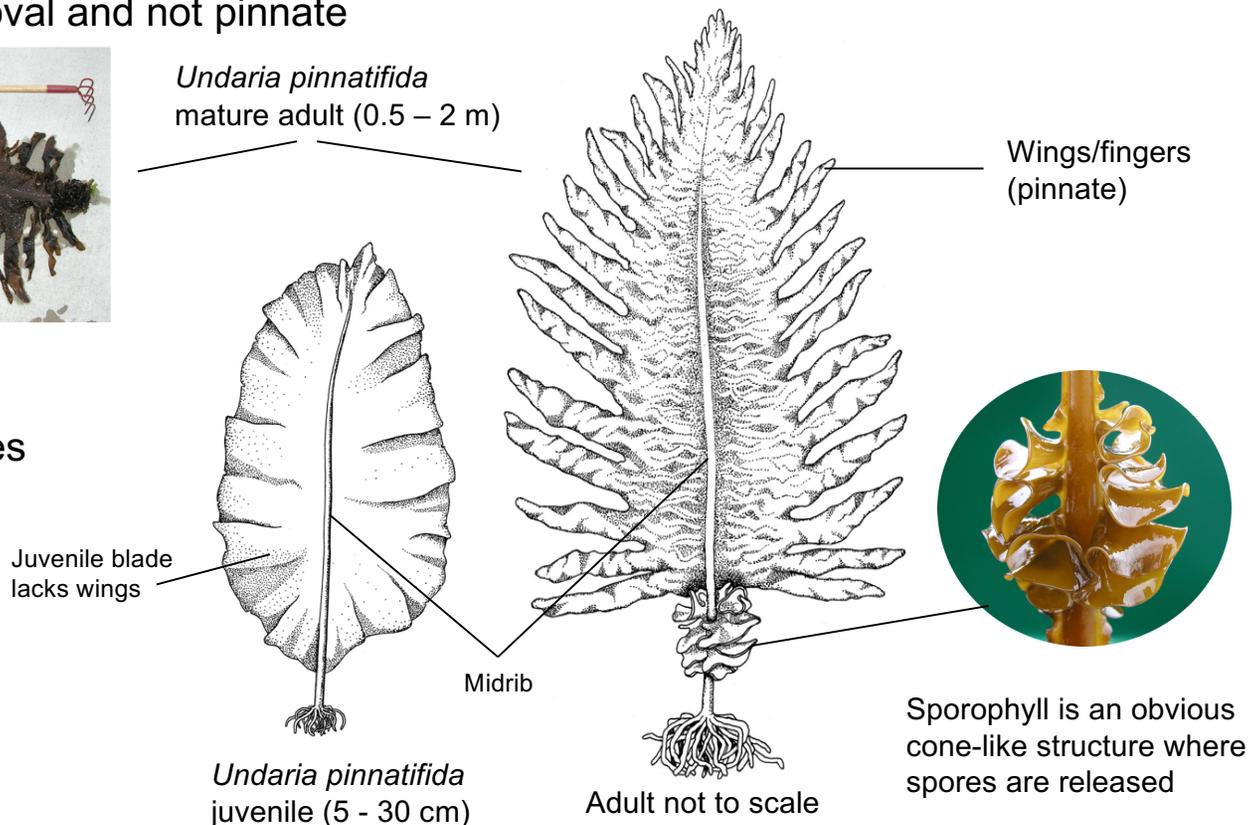
- Brown kelp with wide blade and regular wings/fingers (pinnate)
- Conspicuous midrib is light brown and smooth
- Small holdfast, with small haptera (diameter 2 - 4 mm)
- Adult with obvious sporophyll, a highly folded cone-like structure above holdfast that releases millions of spores
- Juvenile has minor midrib and lacks a sporophyll while the blade is oval and not pinnate

HABITAT PREFERENCES

- Low intertidal to 20 m deep
- Attached to hard surfaces including rocks, docks, pilings, moorings, ropes
- Sheltered, calm and clear waters

INVADED HARBORS in CENTRAL CALIFORNIA

- Monterey Harbor in 2002
- Pillar Point Harbor in 2009
- San Francisco and South Beach Marinas in 2009



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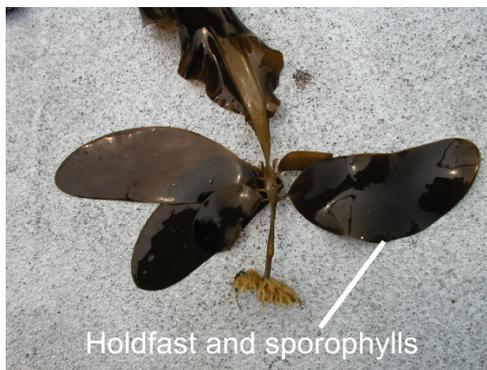
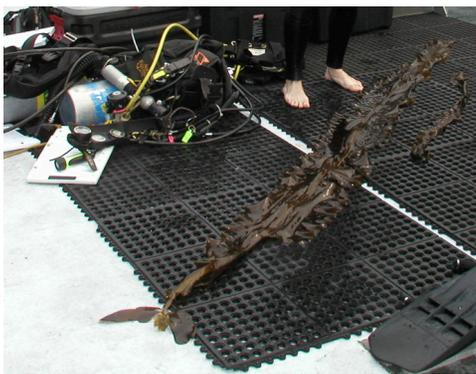
INVASION STATUS AND CONCERNS

Undaria pinnatifida is an invasive kelp native to Japan. Commonly known as 'wakame', an ingredient in miso soup, this alga is commercially grown throughout Asia for human consumption. It has invaded many of the world's oceans, from European waters, to waters off New Zealand. In 2001, *Undaria* was discovered in southern California harbors and rapidly spread up and down the coast. Monterey Harbor contained the northern-most population from 2002-2009, but then *Undaria* was found in Half Moon Bay and southern San Francisco Harbors by researchers with the Smithsonian Environmental Research Center (SERC). *Undaria* is a prolific species and can grow up to 1-2 cm per day, reaching a maximum length of 2.5 m in central CA.

Undaria can settle and grow on a wide variety of surfaces including boat hulls, cement and wood pilings, shells and rocks, monofilament, and even other organisms (e.g., limpets, tunicates, mussels, and even other algae). Globally, *Undaria* fouls ship hulls, nets, fishing gear, moorings, ropes, and other commercial and recreational structures, increasing labor and maintenance costs. The ecological impacts vary by region, and in Monterey Harbor *Undaria* competes with native algae but also serves as habitat for native fishes and is readily consumed by herbivores.

SIMILAR SPECIES

Alaria marginata: holdfast very small and flat; broad, smooth, oval sporophylls; adult 2-3 m long, ruffled margin but non-pinnate; strong midrib; only occurs in low intertidal to shallow subtidal.



Dictyoneurum/Dictyoneuropsis: broad blade and wide but faint midrib, non-pinnate; wrinkled surface; adult <0.5 m.



Costaria costata: broad blade and non-pinnate; wrinkled surface; one side with 2 grooves, the other with 3 grooves; adult <0.5 m.

