The Skates of Alaska: Distribution, Abundance, and Taxonomic Progress

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Bathyraja mariposa

Introduction

Historically, skate populations in the eastern North Pacific and Bering Sea have been inadequately studied and inaccurately represented because of incomplete taxonomic knowledge and difficulties in obtaining accurate species identifications. As a result of collaborative efforts among many taxonomists and fisheries biologists, recent NMFS Alaska Fisheries Science Center (AFSC) bottom trawl survey data reflect great improvements in the reliability of skate identifications, and have been instrumental in the description of new taxa. A data set compiled from the catch records of bottom trawl surveys from 1999 to 2004, including the Gulf of Alaska, Aleutian Islands, and eastern Bering Sea, gives a comprehensive overview of the skate fauna of Alaska. Here we summarize the general patterns of diversity and abundance that have begun to emerge from these data, as well as some recent taxonomic advances concerning the skates of Alaska.

Bathyraja sp. cf. *parmifera*

Diversity Patterns:

In Alaskan waters, skate diversity is generally higher on the continental slope than on the shelf, as many species are found only in deeper waters. The area of greatest skate diversity is the upper continental slope of the Bering Sea (Fig. 1). In this region it is not uncommon to encounter 5 or 6 species of skates in a single bottom trawl. This diversity reflects the presence of a "deepwater" assemblage of *Bathyraja*, including species such as the whitebrow skate (*B. minispinosa*), roughtail skate (*B. trachura*), and Commander skate (*B. lindbergi*), all of which are rarely encountered on the continental shelf (Fig. 2). In contrast, skate diversity is particularly low on the Bering Sea shelf, where the fauna is dominated by one species, the Alaska skate (*B. parmifera*), which accounts for over 90% of the skate catch during the AFSC's Bering Sea shelf bottom trawl survey. In the Gulf of Alaska, skate diversity tends to be greatest in Shelikof Strait, where it is not uncommon to encounter 3 or 4 species of skates in a single haul, particularly at the deeper survey stations. Skates of the genus *Raja* (big skate and longnose skate) contribute more to the diversity in this region than in other parts of Alaska.

Abundance:

Although skate species diversity is particularly low on the Bering Sea shelf, skate abundance appears to be generally high in this region (Fig. 3). Skates are encountered in nearly every haul on the Bering Sea shelf bottom trawl survey, and they often occur in large numbers, particularly on the outer shelf in the northern Bering Sea. Skate abundance is also consistently high along the Bering Sea slope, and in isolated areas of the central and western Aleutians, where a higher diversity of species make up the total abundance. In the Gulf of Alaska, big skates and longnose skates (*Raja binoculata* and *R. rhina*, respectively) make up a high proportion of the catch. These large species are most abundant in the Kodiak Island region.

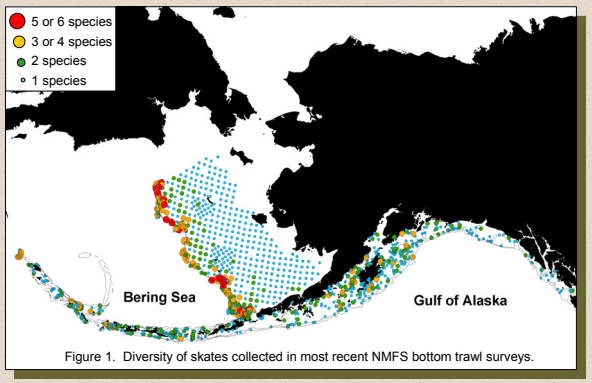

Figure 1. Diversity of skates collected in most recent NMFS bottom trawl surveys.

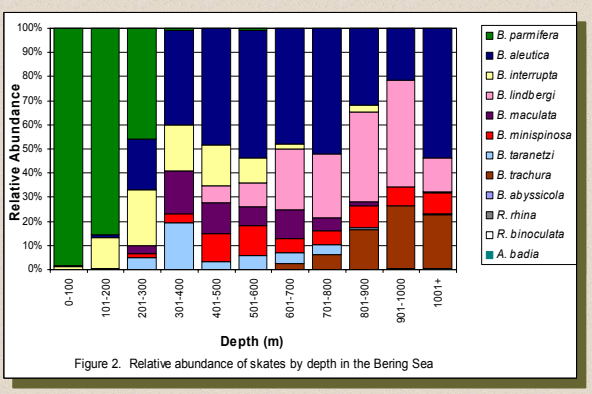

Figure 2. Relative abundance of skates by depth in the Bering Sea

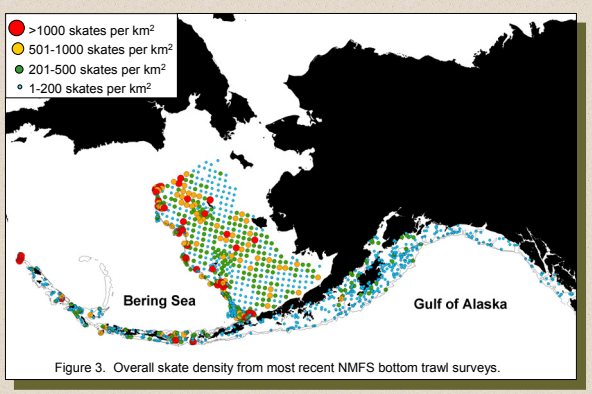

Figure 3. Overall skate density from most recent NMFS bottom trawl surveys.

Taxonomic Progress:

Over the past several years, two new species have been discovered in the Aleutian Islands. One of these species, *Bathyraja mariposa*, is apparently endemic to the central Aleutian Islands (Stevenson et al., 2004). The other, as yet undescribed species, *Bathyraja* sp. cf. *parmifera*, is currently known only from the western Aleutians. In addition to these new species, one additional species (*Amblyraja badia*) was recently reported from Alaskan waters for the first time (Stevenson and Orr, 2005), and the distributions of many of the deeper water species are now known in greater detail than ever before. Fifteen species of skates representing three genera (see table below) are now known from Alaskan waters, and there is more taxonomic work to be done. One or more of the species currently known from Alaska may actually be a complex of two or more species, and studies into these forms are currently ongoing.

Future Work:

Recent advances in skate taxonomy and continuing documentation of skate distribution and abundance patterns have provided the foundation for a number of ongoing studies. In addition to ongoing taxonomic work, we are currently producing a color field guide to the chondrichthyans of Alaska. This guide will include dichotomous keys to adults and egg cases. Photographs, diagnoses, and distribution information will be provided for all the chimaeras, sharks, and skates known from Alaska. Early versions of this field guide have allowed North Pacific groundfish observers to begin routinely identifying skates to the species level. We are also working with NMFS scientists Mike Canino and Ingrid Spies to produce a DNA-based species identification assay that will aid in the identification of damaged or partial specimens, and may help to identify cryptic species.

Most Common Species by Area

Gulf of Alaska
- *R. binoculata*
- *R. rhina*
- *B. interrupta*

Aleutian Islands
- *B. maculata*
- *B. taranetzi*
- *B. parmifera*

Bering Sea shelf (<250m)
- *B. parmifera*
- *B. interrupta*

BS upper slope (250-500m)
- *B. aleutica*
- *B. interrupta*
- *B. maculata*

BS middle slope (>500m)
- *B. aleutica*
- *B. lindbergi*
- *B. trachura*

Species of Skates Known from Alaska

Species	Depth Range (m)
Amblyraja badia (Roughshoulder skate)	1061-2322
Bathyraja abyssicola (Deepsea skate)	362-2904
Bathyraja aleutica (Aleutian skate)	15-1602
Bathyraja interrupta (Bering skate)	26-1050
Bathyraja lindbergi (Commander skate)	126-1193
Bathyraja maculata (Whiteblotched skate)	73-1193
Bathyraja mariposa (Butterfly skate)	90-448
Bathyraja minispinosa (Whitebrow skate)	150-1420
Bathyraja parmifera (Alaska skate)	17-392
Bathyraja taranetzi (Mud skate)	58-1054
Bathyraja trachura (Roughtail skate)	213-2550
Bathyraja violacea (Okhotsk skate)	124-510
Bathyraja sp. cf. *parmifera* (Leopard skate)	48-396
Raja binoculata (Big skate)	16-402
Raja rhina (Longnose skate)	9-1069

Sources:

Stevenson, D. E., J. W. Orr, G. R. Hoff, and J. D. McEachran. 2004. *Bathyraja mariposa*, a new species of skate (Rajidae: Arhynchobatinae) from the Aleutian Islands. Copeia 2004:305–314.

Stevenson, D. E., and J. W. Orr. 2005. New records of two deepwater skate species from the eastern Bering Sea. Northwestern Naturalist 86:71–81.

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