

hippoglossus), there is little apparent difference in form. Personal examination of both species and consultation with experts left little doubt that the vertebrae and caudal bones of the two species are quite indistinguishable. Any variation in form was not easily detected in the individual elements of the head, and is therefore considered negligible for archaeological purposes.

References: Traquair 1865; Boulenger 1902; Regan 1910; Gregory 1933.

Comparative analysis of fish skeletons was conducted at the Museum of Zoology, University of Cambridge in England, where Atlantic specimens were available for examination. Pacific specimens were obtained from Vancouver, B.C., Canada.

Interoceanic comparative studies of fish osteologies are very rare. However, from an archaeological point of view, specimens from either ocean can be considered as representative of their respective families. This conclusion is based on an examination of the general form and particular distinguishing features and attributes of the individual bony elements. The aim of this comparative study was not to develop new criteria for species classification, but rather to confirm that the above specimens are representative of species from both oceans. Archaeologists working on the North Atlantic Coast can identify their material on the basis of illustrations of Pacific species, and the converse holds for North Pacific archaeologists.

Organization

The manual is divided into five sections. The first section is an introduction to the general fish skeleton; the cranium and lateral facial bones, the appendicular skeleton, and the axial skeleton. The subsequent sections are individually illustrated osteologies, presented in taxonomic order, of the salmon, cod, rockfish, and halibut. The bone elements are disarticulated and organized by anatomical region. The drawings are organized by species rather than element because the range and morphology of skeletal elements varies considerably between species. As an aid to preparing reference collections it is more useful to have the elements of each species kept together.

Because the goals of archaeologists differ from those of biologists, the bones are not necessarily represented at the angle in which they naturally occur in the articulated skeleton. Most of the elements show at least two viewpoints from

which the most identifiable and recognizable features are visible. Unless otherwise specified, the drawings are of the right side. Due to the asymmetric skull of the halibut, several elements from right and left sides show distinct differences. Where this applies, both sides are illustrated, unless the difference is merely one of size.

Each element is depicted actual size in order to emphasize as much detail as possible. Drawings at this scale and level of detail will enable the analyst to differentiate between various fish taxa through recognition of characteristic bone structures and features. At this scale, the relative size differences among various elements of different species also become apparent. For example, the coracoid of a 90cm long salmon is just slightly smaller than that of a rockfish just over half its size. However, it is important to remember that within families and within species, elements can exhibit a wide range of size and morphological variability. Within species element size is a direct function of fish size which continues to increase with the age of the fish.

Terminology

As far as terminology is concerned, five major sources have been drawn upon. These are Starks (1901), Gregory (1933), Norden (1961), Mujib (1967), and Bond (1979). Much controversy still exists among ichthyologists concerning the standardization of nomenclature. Therefore, most of the terminology used here is derived from Starks (1901) and Gregory (1933). Where there are bones specific to certain species, the terms have been taken from the relevant literature; ie. Mujib (1967) for the cod, and Norden (1961) for the salmon. Where new terms have come into common usage, these have been substituted for the older terms of Starks (1901) and Gregory (1933) (ie. from Gifford and Crader 1977; Bond 1979; Courtemanche and Legendre 1985).

An important factor to note in the naming of fish bones is the difference in the number of bones present among various fish taxa. While much of the skeleton of the lower bony fishes is cartilagenous, it also tends to have a greater variety of bones (Bond 1979). For example, the salmons have 7-8 circumorbitals, a mesocoracoid, orbitosphenoid, supramaxilla, suprapreopercle, and numerous caudal bones. The halibut (a higher teleost) lacks most of the above mentioned elements, and has only one nasal. The caudal fin has been reduced to two epurals and two hypurals, and the orbitals have been reduced to several minute tubular ossicles.