The Flora and Fauna of a Basin in Central Florida Bay

By

J. HAROLD HUDSON, DONALD M. ALLEN,
and
T. J. COSTELLO, Fishery Biologists

Bureau of Commercial Fisheries
Tropical Atlantic Biological Laboratory
Miami, Florida 33149

ABSTRACT

One hundred ninety-six species of plants and animals are reported from a nursery area for pink shrimp, *Penaeus duorarum duorarum*, in a basin of central Florida Bay. Many of the organisms are benthic and associated with shallow beds of turtle grass, *Thalassia testudinum*. Although abrupt habitat variations may affect species distribution, the general distribution of organisms in the basin and bay defines environments influenced by different water masses.

INTRODUCTION

Florida Bay is at the southern tip of the Florida peninsula. The bay serves as a nursery ground for pink shrimp, *Penaeus duorarum duorarum*, before they move to the Tortugas shrimping grounds, northwest of Key West (Costello and Allen, 1966).

As part of an ecological study of the Tortugas pink shrimp population, we made a sampling survey of young pink shrimp and associated organisms in central Florida Bay (fig. 1). The incidence of certain plants and animals in the bay may help us detect environments that are suitable for young pink shrimp. With few exceptions, the plants and animals collected were identified to species and form the list contained in this preliminary report. Except in very general terms, we make no attempt to relate these organisms to the environment. Distribution, abundance, and ecology are left for a later report.

Past ecological studies in Florida Bay include those by Tabb and Manning (1961) and Tabb, Dubrow, and Manning (1962). Their work was confined to the northwestern section of the bay, whereas our report concerns central Florida Bay.

DESCRIPTION OF AREA

Detailed descriptions of the Florida Bay environment were given by Ginsburg (1956) and Gorsline (1963). This shallow bay has an extensive complex of mangrove keys and intersecting mudbanks covered with seagrasses. The network of banks and keys separates the bay into semienclosed basins, locally called "lakes," 40 to 300 cm. deep.

Porpoise Lake, which we selected for study, is a triangular-shaped basin in the east-central portion of the bay (fig. 1). It is bordered on the northwest by the Fox trot Keys and on the north by Bob Allen Key (fig. 2). The lake has an area of about 10.4 km² and a maximum depth of 210 cm. Sediments in the lake and on surrounding banks are mainly carbonate mud mixed with varying amounts of shell fragments and plant detritus. The banks are carpeted with extensive beds of turtle grass, *Thalassia testudinum*, which extend into the lake but thin rapidly with increasing water depth. The fringe area between the *Thalassia* and the keys is narrow and covered intermittently with sparse patches of shoal grass, *Diplanthera wrightii*.

Numerous small channels cut through the enclosing banks to connect Porpoise Lake with surrounding lakes and, finally, the Atlantic Ocean and Gulf of Mexico. The depth of these channels varies from 80 to 245 cm., and they
Figure 1.—Location of Porpoise Lake in Florida Bay.

Figure 2.—Porpoise Lake, with surrounding banks and keys.
have an irregular floor of soft carbonate mud, with patches of bedrock exposed by scouring. Moderate to dense stands of Thalassia and Diplanthera cover the mud deltas at each end of the channels and, to some extent, the channels themselves where sediments are sufficiently deep to afford them attachment. Numerous "grass" ledges are formed along the channel banks where undercutting removes the soft sediments, leaving a dense mat of overhanging Thalassia rhizomes.

In addition to passing through the channels, water also is exchanged across the surfaces of the banks, but the dense cover of epiphyte-laden Thalassia restricts this flow and acts as an efficient baffle and filtering system. Although tidal water extends into the lake (McCallum and Stockman, 1964), poor flushing is indicated by abrupt differences in water clarity and salinity between the lake and the ocean water to the south. Strong winds and seasonal changes in ocean level cause the largest fluctuations in the lake's water level (Ginsburg, 1956). Maximum observed difference in lake level was 38 cm.

We measured salinities and temperatures of the lake water at monthly intervals from November 1964 to January 1968 (table 1). Highest salinity (49.6 p.p.t.) was recorded in July 1965; lowest salinity (27.8 p.p.t.) in September 1966. McCallum and Stockman (1964) reported that in Florida Bay, "...fluctuations in the amount of fresh-water run-off from the mainland produce seasonal and annual fluctuations in salinity." The lack of rainfall in the summer of 1965, and, conversely, the abundance of rainfall in the summer of 1966, were primarily responsible for the difference in the two salinity values. Surface temperature in the lake ranged from 32.2 °C, in September 1965 to 16.6 °C, in December 1966.

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1 = No data
METHODS

From April 1965 to January 1968 we collected samples each month in a Thalassia bed adjacent to Bob Allen Key (fig. 2). These samples were taken with a sled-mounted suction sampler (Allen and Hudson)\(^1\) and a slednet,\(^2\) The suction sampler captures both epifauna and infauna, whereas the slednet captures epifauna only. These devices also were used to sample in Thalassia beds on the east, south, and northwest banks of the lake. To supplement the catches made by the suction sampler and slednet, we used a pushnet (Allen and Inglis, 1958), beach seine, and castnet, together with hand collecting.

A bait-shrimp vessel with two roller-frame trawls (Woodburn, Eldred, Clark, Hutton, and Ingle, 1957) was used to sample the lake's biota at night. This method enabled us to investigate more thoroughly the large expanse of lake bottom and capture nocturnal species.

We used face mask and snorkel to examine the channels. The organisms were collected by hand, handnet, and hook and line.

Despite the variety of gear, we did not collect many species known to inhabit the lake. Also, we did not attempt to retain plants and animals less than 5 mm. long or wide.

PORPOISE LAKE SPECIES LIST

<table>
<thead>
<tr>
<th>Scientific name</th>
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<td>Family Dasycladaceae</td>
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<td>Batophora oerstedii var. occidentalis (Harvey) Howe</td>
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<td>Family Valoniaceae</td>
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<td>Anadyomene stellata (Wulfen) C. Agardh</td>
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<td>Cladophoropsis membranacea (C. Agardh) Børgeresen</td>
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<td>Caulerpa paspaloides var. wurdemanni Weber-van Bosse</td>
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<td>Caulerpa lanuginosa J. Agardh</td>
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<td>Penicillus capitatus Lamarck</td>
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<td>Penicillus dumetosus (Lamouroux) Blainville</td>
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<tr>
<td>Rhipocephalus phoenix (Ellis and Solander) Kützing</td>
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<td>Udotea spinulosa Howe</td>
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<td>Spyridia filamentosa (Wulfen) Harvey</td>
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<td>Ceramium rubrum (Hudson) C. Agardh</td>
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<td>Family Rhodomelaceae</td>
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<td>Laurencia poitei (Lamouroux) Howe</td>
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<tr>
<td>Digenia simplex (Wulfen) C. Agardh</td>
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</table>

\(^1\) Donald M. Allen and J. Harold Hudson. 1969. A sled-mounted suction sampler for benthic organisms. Unpublished manuscript, 13 pp., filed at the Bureau of Commercial Fisheries Tropical Atlantic Biological Laboratory, Miami, Fla. 33149.

\(^2\) A hand-pulled frame trawl, similar to that described by Pullen, Mock, and Ringo (1968).
SEA GRASSES
Family Hydrocharitaceae
Thalassia testudinum König

Family Zosteraceae
Diplanthera wrightii (Ascherson) Ascherson
Syringodium filiforme Kützing

SPONGES
Family Chondrillidae
Chondrilla nucula Schmidt

Family Dysideidae
Dysidea fragilis (Montagu) Johnson

COELENTERATES
Family Rhizophysiidae
Physalia physalis Linnaeus

Family Chondrophoridae
Velella velella Linnaeus

Family Poritidae
Porites porites var. furcata Lamarck

Family Faviidae
Solenastrea hyades (Dana)

BRYOZOANS
Family Schizoporellidae
Schizoporella sp.

ANNELIDS
Family Polynoidae
Harmothoe aculeata Andrews

Family Hesionidae
Hesionella picta Müller

Family Nereidae
Ceratonereis mirabilis Kinberg

Family Glyceridae
Glycera sp.

Family Dorvilleidae
Dorvillea rudolphii (delle Chiaje)

Family Spionidae
Prionospio heterobranchia Moore
Family Ophellidae

Armandia maculata (Webster) Javelin worm

MOLLUSKS

Family Fissurellidae

Diodora cayenensis Lamarck Cayenne keyhole limpet

Calliostoma juvinum tampense Conrad Jujube top-shell
Tegula fasciata Born Smooth Atlantic tegula

Family Trochidae

Family Turbinidae

Turbo castaneus Gmelin Chestnut turban
Astraea phoebea Röding Long-spined star-shell
Astraea tecta americana Gmelin American star-shell

Family Modulidae

Modulus modulus Linnaeus Atlantic modulus

Family Potamididae

Batillaria minima Gmelin False cerith

Family Cerithidae

Cerithium muscarum Say Fly-specked cerith

Family Calyptraeidae

Crepidula convexa Say Convex slipper-shell
Crepidula plana Say Eastern white slipper-shell

Family Muricidae

Murex cellulosus Conrad Pitted murex
Muricopsis ostrearum Conrad Mauve-mouth drill
Eupleura sulcidentata Dall Sharp-ribbed drill

Family Columbellidae

Columella rusticoides Heilprin Rusty dove-shell

Family Melongenidae

Melongena corona Gmelin Common crown conch
Busycon contrarium Conrad Lightning whelk
Busycon spiratum Lamarck Pear whelk

Family Nassariidae

Nassarius vibex Say Common eastern nassa
Nassarius albus Say Variable nassa

Family Fasciolariidae

Fasciolaria tulipa Linnaeus True tulip
Fasciolaria hunteria Perry Banded tulip

Family Olividae

Olivella minuta Link Minute dwarf olive

Family Marginellidae

Prunum apicinum Menke Common Atlantic marginella
Conus stearnsi Conrad
Family Conidae
Stearn's cone

Cerodrillia thea Dall
Family Turridae
Thea drillia

Bulla striata Bruguière
Family Bullidae
Striate bubble

Haminoea antillarum Orbigny
Family Atyidae
Antillean paper-bubble

Ischnochiton papillosus C. B. Adams
Family Ischnochitonidae
Mesh-pitted chiton

Arcopsis adamsi E. A. Smith
Family Arcidae
Adams' miniature ark

Brachidontes exustus Linnaeus
Family Mytilidae
Scorched mussel

Pinctada radiata Leach
Family Pteriidae
Atlantic pearl oyster

Argopecten irradians concentricus (Say)
Family Pectinidae
Atlantic bay scallop

Lima pellucida C. B. Adams
Family Limidae
Antillean lima

Cardita floridana Conrad
Family Carditidae
Broad-ribbed cardita

Codakia orbiculata Montagu
Family Lucinidae
Dwarf tiger lucina

Laevicardium mortoni Conrad
Family Cardiidae
Morton's egg cockle

Chione cancellata Linnaeus
Family Veneridae
Cross-barred venus

Anomalocardia cuneimeris Conrad
Pointed venus

Transnella cubaniana Orbigny
Cuban transnella

Transnella stimpsoni Dall
Stimpson's transnella

Tellina tampaeensis Conrad
Family Tellinidae
Tampa tellin

Tellina similis Sowerby
Candy stick tellin

Tellina lineata Turton
Rose petal tellin

Lyonia hyalina floridana Conrad
Family Lyonsiidae
Glassy lyonia

Octopus joubini Robson
Family Octopodidae
Joubin's octopus
HORSESHOE CRABS

Family Limulidae

*Limulus polyphemus* Linnaeus

Horseshoe crab

PYCNOGONIDS

Family Phoxichilidiidae

*Anoplodactylus insignis* (Hoek)
*Anoplodactylus lentus* Wilson
*Anoplodactylus pectinus* Hedgpeth

Family Ammothelidae

*Nymphopsis duodorsospinosa* Hilton

CRUSTACEANS

Family Balanidae

*Balanus amphitrite niveus* Darwin

Family Anthuridae

*Cyathura polita* (Stimpson)

Family Cirolanidae

*Cirolana parva* Hansen

Family Aegidae

*Rocinella signata* Schioedte and Meinert

Family Sphaeromidae

*Paracerceis caudata* (Say)
*Cymodoce faxonii* (Richardson)
*Sphaeroma destructor* Richardson

Family Idoteidae

*Cleantis planicauda* Benedict
*Erichsonella floridana* Benedict

Family Penaeidae

*Penaeus duorarum duorarum* Burkenroad

Pink shrimp

Family Palaemonidae

*Leander paulensis* Ortmann
*Leander tenuicornis* (Say)
*Periclimenes americanus* (Kingsley)
*Periclimenes longicaudatus* (Stimpson)

Family Alpheidae

*Alpheus heterochaelis* Say
*Alpheus normanni* Kingsley

Big-clawed snapping shrimp

Green snapping shrimp

Family Hippolytidae

*Hippolyte pleuracantha* (Stimpson)
*Latreutes fucorum* (Fabricius)
*Thor* sp.
*Tozeuma carolinense* Kingsley

Bayonet shrimp

8
Processa sp. Family Processidae

Pamulirus argus (Latreille) Family Palinuridae

Pagurus bonaiensis Schmitt Family Paguridae

Paguristes tortugae Schmitt Family Diodonidae
Petrochirus diogenes (Linnaeus)

Dromidia antillensis Stimpson Family Dromiidae

Calappa sp. Family Calappidae

Callinectes sapidus Rathbun Family Portunidae
Callinectes ornatus Ordway
Portunus depressifrons (Stimpson)
Cronius ruber (Lamarck)

Menippe mercenaria (Say) Family Xanthidae
Neopanope packardi (Kingsley)

Libinia dubia H. Milne Edwards Family Majidae
Mithrax spinosissimus (Lamarck)
Pithe anisodon (von Martens)

ECHINODERMS

Echinaster sentus (Say) Family Echinasteridae

Amphioptus abditus (Verrill) Family Amphiuridae
Amphiodia pulchella (Lyman)

Ophiactis savignyi (Müller and Troschel) Family Ophiactidae

Ophiothrix norstedii Lütken Family Ophiotrichidae

Holothuria floridana Poulalès Family Holothuriidae

Diadema antillarum (Philippi) Family Diadematidae

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Spiny lobster

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Blue crab

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Stone crab

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Long-spined sea urchin
CHAETOGNATHS
Family Sagittidae

Sagitta hispida Conant
Arrowworm

FISHES
Family Orectolobidae

Ginglymostoma cirratum (Bonnaterre)
Nurse shark

Family Carcharhinidae

Negaprion brevirostris (Poey)
Lemon shark

Family Sphyrnidae

Sphyrna tiburo (Linnaeus)
Bonnehead shark

Family Pristidae

Pristis pectinatus Latham
Smalltooth sawfish

Family Dasyatidae

Dasyatis americana Hildebrand and Schroeder
Southern stingray

Family Elopidae

Elops saurus Linnaeus
Ladyfish
Megalops atlantica Valenciennes
Tarpon

Family Albulidae

Albula vulpes (Linnaeus)
Bonefish

Family Clupeidae

Harengula pensacolaef Goode and Bean
Scaled sardine
Opisthonema oglinum (LeSueur)
Atlantic thread herring

Family Engraulidae

Anchoa mitchilli (Valenciennes)
Bay anchovy
Anchoa lamprotaenia Hildebrand
Longnose anchovy

Family Synodontidae

Synodus foetens (Linnaeus)
Inshore lizardfish

Family Ariidae

Galeichthys felis (Linnaeus)
Sea catfish

Family Belonidae

Strongylura notata (Poey)
Redfin needlefish

Family Hemiramphidae

Chirodorus atherinoides Goode and Bean
Hardhead halfbeak
Hyrophamphus unisfasciatus (Ranzani)
Halfbeak

Family Cyprinodontidae

Cyprinodon variegatus Lacépède
Sheepshead minnow
Lucania parva (Baird and Girard)
Rainwater killifish

Family Poeciliidae

Poecilia latipinna (LeSueur)
Sailfin molly
Family Syngnathidae

Hippocampus zosterae Jordan and Gilbert
Syngnathus floridensis (Jordan and Gilbert)
Syngnathus scovelli (Evermann and Kendall)
Microgobius crinigerus (Bean and Dresel)

Dwarf seahorse
Dusky pipefish
Gulf pipefish
Fringed pipefish

Family Centropomidae

Centropomus undecimalis (Bloch)

Family Serranidae

Epinephelus itajara (Lichtenstein)
Mycteroperca microlepis (Goode and Bean)

Snook
Jewfish
Gag

Family Lutjanidae

Lutjanus griseus (Linnaeus)
Lutjanus synagris (Linnaeus)
Lutjanus apodus (Walbaum)

Gray snapper
Lane snapper
Schoolmaster

Family Rachycentridae

Rachycentron canadum (Linnaeus)

Cobia

Family Carangidae

Caranx crysos (Mitchill)
Caranx hippos (Linnaeus)
Oligoplites saurus (Bloch and Schneider)

Blue runner
Crevalle jack
Leatherjacket

Family Gireidae

Eucinostomus argenteus Baird and Girard
Eucinostomus gula (Quoy and Gaimard)

Spotfin mojarra
Silver jenny

Family Pomadasyidae

Haemulon sciurus (Shaw)
Orthopristis chrysopterus (Linnaeus)

Bluestriped grunt
Pigfish

Family Sciaenidae

Cynoscion nebulosus (Cuvier)
Sciaenops ocellata (Linnaeus)

Spotted seatrout
Red drum

Family Sparidae

Archosargus probatocephalus (Walbaum)
Lagodon rhomboides (Linnaeus)

Sheepshead
Pinfish

Family Ephippidae

Chaetodipterus faber (Broussonet)

Family Pomacentridae

Abudesdus saxatilis (Linnaeus)

Atlantic spadefish

Family Labridae

Halichoeres bivittatus (Bloch)

Sergeant major

Family Gobiidae

Gobiosoma robustum Ginsburg
Microgobius microlepis Longley and Hildebrand
Microgobius gulosus (Girard)

Code goby
Banner goby
Clown goby

Family Triglidae

Prionotus pectoralis (Nichols and Breder)

Blackwing searobin
Family Clinidae

*Chaenopsis ocellata* Poey
*Paracrinus marmoratus* (Steindachner)

Family Blenniidae

*Blennius marmoratus* Poey

Family Sphyraenidae

*Sphyraena barracuda* (Walbaum)

Family Mugilidae

*Mugil curema* Valenciennes
*Mugil cephalus* Linnaeus

Family Atherinidae

*Membras martinica* (Valenciennes)
*Allanetta harringtonensis* (Goode)

Family Soleidae

*Achirus lineatus* (Linnaeus)

Family Gobiesocidae

*Gobiesox strumosus* Cope

Family Ostraciidae

*Acanthostracion quadricornis* (Linnaeus)

Family Tetraodontidae

*Sphaeroides nephelus* (Goode and Bean)

Family Diodontidae

*Chilomycterus schoepfi* (Walbaum)

Family Batrachoididae

*Opsanus beta* (Goode and Bean)

Family Callionymidae

*Callionymus pauciradiatus* Gill

MARINE MAMMALS

*Family Delphinidae*

*Tursiops truncatus* Montague

Bluethroat pikeblenny
Marbled blenny

Marbled blenny

Seaweed blenny

Great barracuda

White mullet
Striped mullet

Rough silverside
Reef silverside

Lined sole

Skilletfish

Cowfish

Southern puffer

Striped burrfish

Gulf toadfish

Spotted dragonet

Bottlenose dolphin

**ECOLOGICAL CONSIDERATIONS**

Our survey revealed 169 genera and 196 species of plants and animals in Porpoise Lake. Benthic forms made up 73 percent of the animals listed, and many of them are well-known associates of the seagrass community. The importance of seagrass beds as habitats for small marine animals has been stressed by Phillips (1960), Moore (1963), and Hoese and Jones (1963), among others. We found that young pink shrimp and many small benthic animals (annelids, mollusks, crustaceans, and fishes) were present throughout the year in shallow Thalassia beds bordering the lake. Species not usually found in these seagrass beds inhabited the channels transecting the banks of the lake. These species included the knobby star coral (*Solenastrea hyades*), the long-spined sea urchin (*Diadema antillarum*), the spiny lobster (*Panulirus argus*), and the schoolmaster (*Lutjanus apodus*). Although these species are common on the Atlantic side of the Florida Keys (Springer and McErlean, 1962; Turmel and
Swanson, 1964; Kissling, 1965), they are rare or absent in the channels of northwestern Florida Bay (Tabb and Manning, 1961).

Within the seagrass areas of Porpoise Lake that are superficially homogeneous, several animals had discontinuous distribution. The finger coral (Porites porites var. furcata), the American star-shell (Astraea tecta americana), and the long-spined star-shell (A. phoebeia), were along the southern bank but not the northern bank of this basin. We did not see these species in central Florida Bay north of Porpoise Lake, nor did Tabb and Manning (1961) report them from northwestern Florida Bay. These species are common, however, on the Atlantic side of the Florida Keys (Voss and Voss, 1955; Kissling, 1965).

Ginsburg (1956) observed that organisms which inhabit the reef tract 3 paralleling the Atlantic side of the Florida Keys may be abundant in the outer or marginal zone of Florida Bay where there is tidal exchange with the reef tract and where salinities are near "normal." Furthermore, Turney (1964) found the distribution of mollusks in Florida Bay to be related primarily to water circulation, and he cited A. americana (A. tecta americana) as a characteristic species of the Atlantic margin of Florida Bay, an area of frequent exchange of water with the Atlantic Ocean. This tidal water extends into the southern portion of Porpoise Lake (McCallum and Stockman, 1964) and meets the slowly circulating waters of the inner bay which have fluctuating salinities and temperatures (Gorsline, 1963).

Different masses of water have dissimilar ecological effects and support distinctive populations of organisms (Phleger, 1964; Cerame-Vivas and Gray, 1966). Water movements in Florida Bay produce separate water masses that have unlike characteristics (Gorsline, 1963). Within Porpoise Lake, animal associates of the seagrass beds differ from those of the adjacent channels. These abrupt variations in fauna suggest the effects of extremely local habitats that cannot, necessarily, be attributed to different water masses. The general distribution of organisms in the lake and in Florida Bay, however, defines varied environments created or influenced by different water masses.

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3 Ginsburg defined the reef tract as "the arcuate band-shaped area east, southeast, and south of the Keys between 0 and 300 feet."
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SPRINGER, VICTOR G., and ANDREW J. McERLEAN.

TABB, DURBIN C., DAVID L. DUBROW, and RAYMOND B. MANNING.

TABB, DURBIN C., and RAYMOND B. MANNING.

TURMEL, REAL, and ROGER SWANSON.

TURNEY, W. J.

VOSS, GILBERT L., and NANCY A. VOSS.

WOODBURN, KENNETH D., BONNIE ELDRED, EUGENIE CLARK, ROBERT F. HUTTON, and ROBERT M. INGLE.

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