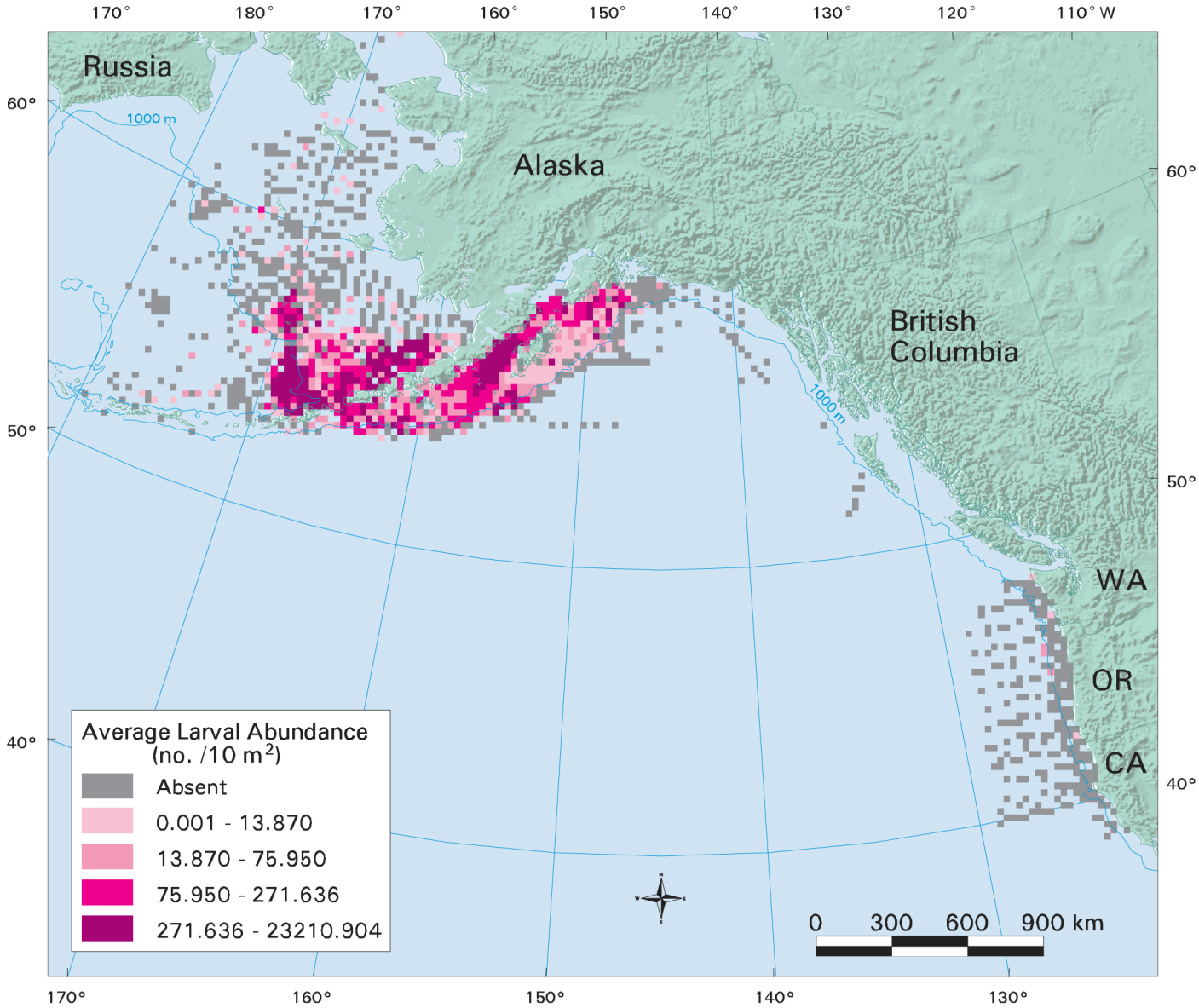
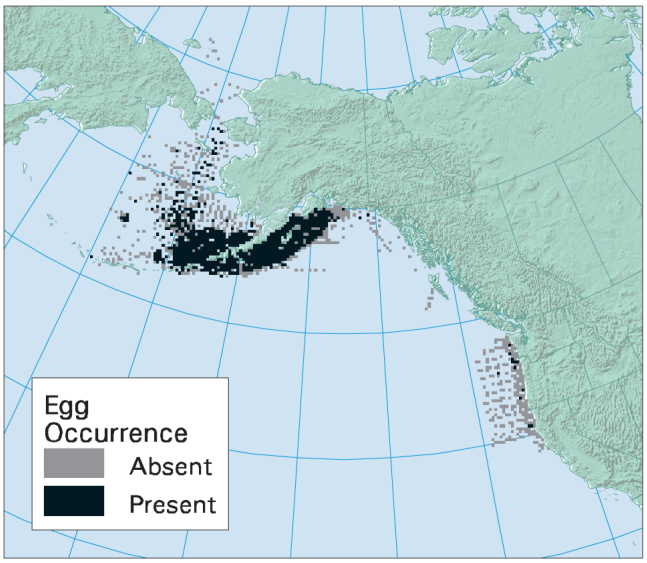
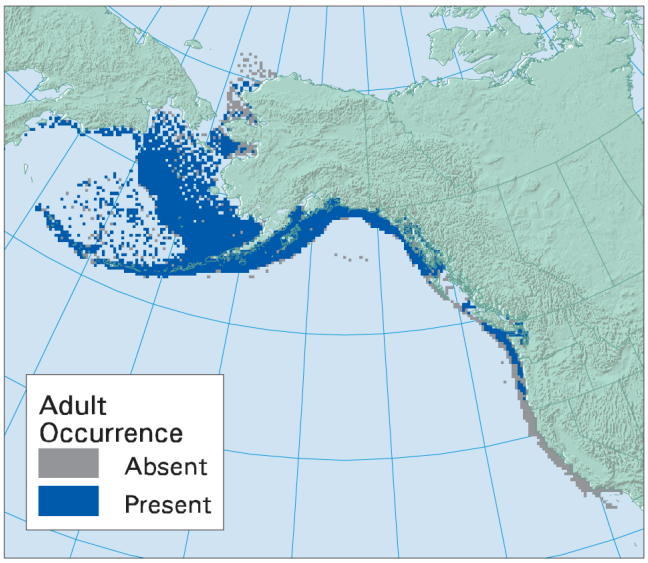

170°
180°
170°
160°
150°
140°
130°
120°
110° W
Russia
1000 m
Alaska
British Columbia
1000 m
WA
OR
CA
60°
50°
40°
Average Larval Abundance (no. /10 m²)
Absent
0.001 - 13.870
13.870 - 75.950
75.950 - 271.636
271.636 - 23210.904
0 300 600 900 km
170°
160°
150°
140°
130°


Egg Occurrence
Absent
Present


Adult Occurrence
Absent
Present

MERISTIC CHARACTERS

BONY PARTS (min-mode-max)

Vertebrae

Total: 48 - 51 - 53
Precaudal: 18 - X - 20
Caudal: 31 - X - 34

Gill Rakers & Branchiostegal Rays

Upper gill rakers: 5 - X - 7
Lower gill rakers: 25 - X - 34
Branchiostegal rays: 6 - X - 8

FIN COUNTS (min-mode-max)

Fin (Position)

Pelvic (Thoracic)	Ray: 6 - X - 7
Dorsal	1st: 10 - 12 - 14
	2nd: 12 - 14 - 18
	3rd: 14 - 17 - 21
Pectoral	Ray: 17 - 20 - 22
Anal	1st: 15 - 18 - 22
	2nd: 15 - 18 - 23

Caudal Fin Counts

Caudal upper secondary: 21 - X - 24
Caudal upper principal: 4 - 4 - 4
Caudal lower principal: 2 - 2 - 2
Caudal lower secondary: 19 - X - 22

LIFE HISTORY FEATURES

GENERAL

Range:	Chukchi Sea, North of 66 °N - Central California, 34 to 38 °N
Ecology:	Epi-, meso-, and bathypelagic, 0-975 m
ELH Pattern:	Oviparous, pelagic eggs, pelagic larvae
Longevity:	17 yr

SPAWNING

Area:	Pelagic (50-460 m)
Season:	Feb - Aug
Mode:	Schools [1]
Fecundity:	Range/function: 91,633-1,200,000 / F=0.1719 X L^3.6046 (Bering Sea only) [2]; 96,216-1,079,540 / F=1.2604 X L^3.2169, L=FL cm (Shelikof Strait only) [3]
Age at first maturity:	3-4 yr
Migration:	Bering Sea, offshore to outer and upper slope [4]; Gulf of Alaska to Shelikof Strait [5]

EARLY LIFE HISTORY DESCRIPTION

EGGS

Diameter (mm):	1.35 - 1.45
No. of oil globules:	
Oil globule diameter:	
Yolk:	Homogeneous
Chorion:	Smooth, clear
Egg/Embryo pigment:	head, nape, gut, dorsal, lateral, ventral
Pigment diagnostics:	Presence of bars
Diagnostic characters:	Late-stage embryo with pigment

LARVAE

Hatch size(mm SL):	3 - 4
Preanal length(%SL):	<50
Flexion length (mm SL):	10 - 17
Length at transformation (mm SL):	30 - 40
Fin ray development sequence:	Caudal, 1st anal, 2nd anal, 3rd dorsal, 2nd dorsal, 1st dorsal, pelvics, pectorals

Larval Pigment Patterns

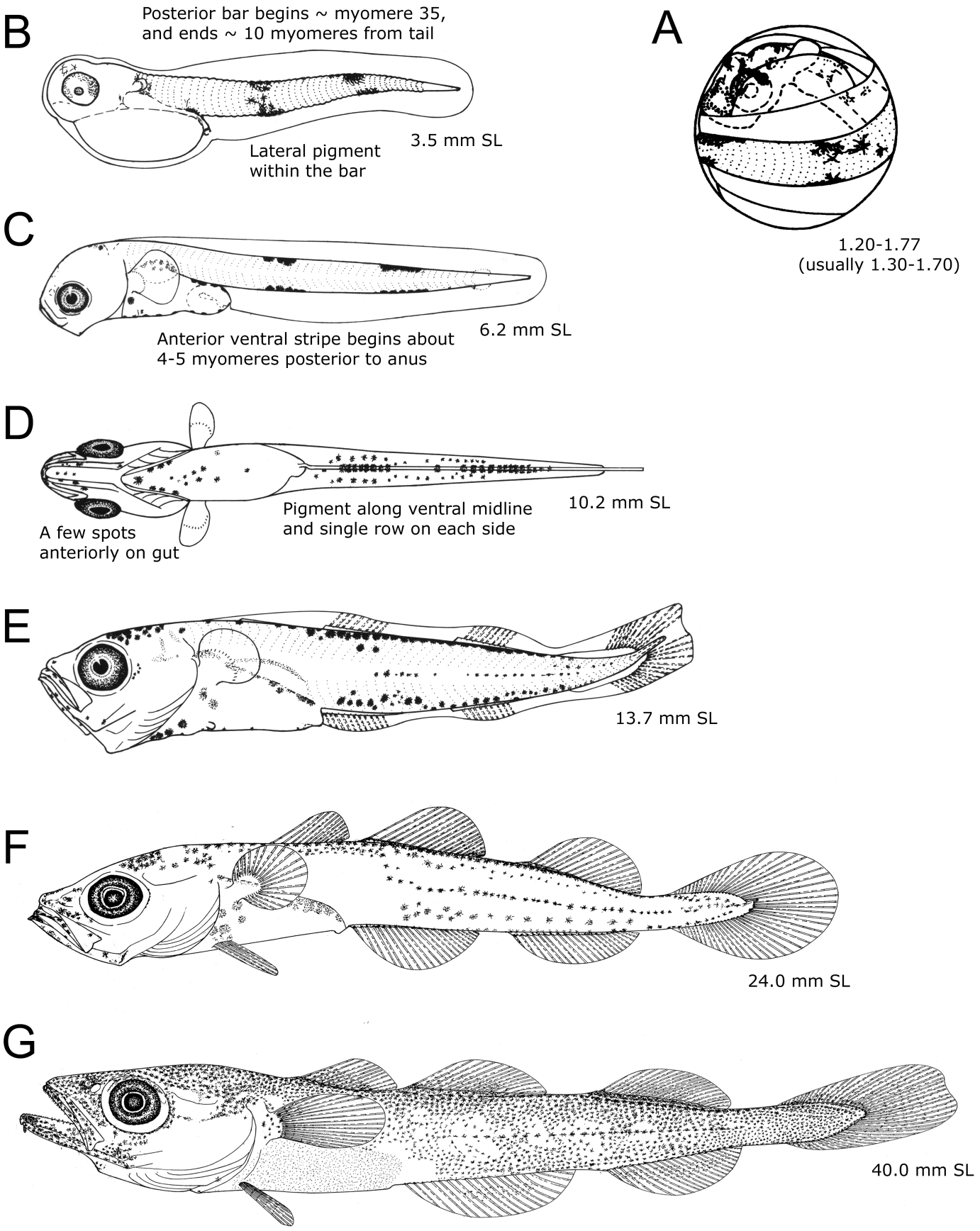
In each developmental larval stage, pigment is present in the regions listed below. For pigment regions see Figure 6.

Yolk-sac: crown, nape, dorsal gut, dorsal, ventral, mediolateral
Preflexion: mouth, crown, nape, isthmus, dorsal gut, lateral gut, ventral gut, dorsal, ventral
Flexion: mouth, crown, nape, cheek, isthmus, dorsal gut, lateral gut, ventral gut, dorsal, ventral, mediolateral, caudal
Postflexion: mouth, crown, nape, cheek, isthmus, dorsal gut, lateral gut, ventral gut, pectoral fin, dorsal, ventral, mediolateral, caudal
Juvenile: mouth, crown, nape, cheek, isthmus, dorsal gut, lateral gut, ventral gut, pectoral fin, dorsal, ventral, mediolateral, caudal

Pigment Diagnostics: Distinguished from *Gadus macrocephalus* at yolksac stage by: more lateral pigment within bars, posterior bar shorter, absence of spots in ventral caudal region, less pigment in snout area and on mouth. Distinguished from *G. macrocephalus* at later stages by: generally less pigmented, especially on head and gut; a few melanophores scattered on ventral surface of gut, discontinuous pigment along ventral midline and single row on each side

Diagnostic characters

Rays on superior hypural = 4, pigment diagnostics


B
Posterior bar begins ~ myomere 35,
and ends ~ 10 myomeres from tail
Lateral pigment
within the bar
3.5 mm SL
A
1.20-1.77
(usually 1.30-1.70)
C
Anterior ventral stripe begins about
4-5 myomeres posterior to anus
6.2 mm SL
D
A few spots
anteriorly on gut
Pigment along ventral midline
and single row on each side
10.2 mm SL
E
13.7 mm SL
F
24.0 mm SL
G
40.0 mm SL

GENERAL REFERENCES

Ref 1: Brown, A. L., M. S. Busby, and K. L. Mier. 2001.
Walleye pollock (*Theragra chalcogramma*) during transformation from the larval to juvenile stage: otolith and osteological development. Mar. Biol. 139:845-851.

Ref 2: Dunn, J.R., and A.C. Matarese. 1984.
Gadidae: Development and relationships. *In* H.G. Moser, W.J. Richards, D.M. Cohen, M.P. Fahay, A.W. Kendall, Jr., and S.L Richardson (eds.), Ontogeny and systematics of fishes. Spec. Publ. 1, Am. Soc. Ichthyol. Herpetol., p. 283-299. Allen Press, Lawrence, KS, 760 p.

Ref 3: Dunn, J.R., and A.C. Matarese. 1987.
A review of the early life history of Northeast Pacific gadoid fishes. Fish. Res. (Amst.) 5:163-184.

Ref 4: Dunn, J.R., and B.M. Vinter. 1984.
Development of larvae of saffron cod, *Eleginus gracilis*, with criteria for identification of gadid larvae in Pacific and Arctic waters contiguous to Canada and Alaska. Can. J. Fish. Aquat. Sci. 41:304-318.

Ref 5: Hirschberger, W.A., and G.B. Smith. 1983.
Spawning of twelve groundfish species in the Gulf of Alaska and Pacific Coast regions, 1975-81. U.S. Dep. Commer., NOAA Tech. Memo., NMFS-NWFSC-44, 50 p.

Ref 6: Matarese, A.C., A.W. Kendall, Jr., D.M. Blood, and B.M. Vinter. 1989.
Laboratory guide to early life history stages of Northeast Pacific fishes. NOAA Tech. Rep. NMFS 80, 652 p.

Ref 7: Salveson, S.J., and M.S. Alton. 1976.
Pollock (family Gadidae). *In* W.T. Pereya, J.E. Reeves, and R.G. Bakkala (eds.), Demersal fish and shellfish resoures in the eastern Bering Sea in the baseline year 1975, p. 369-392. Proc. Rep., Northwest Alaska Fish. Cent., Natl. Mar. Fish. Serv., NOAA, Seattle, WA 98115-0070.

FOOTNOTES

[1] Takahura, T. 1954.
The behavior of the spawning pollock schools recorded by fish detector. Bull. Jpn. Soc. Sci. Fish. 20(1):10-12. [in Jpn., Engl. summ.].

[2] Hinckley, S. 1986.
Spawning dynamics and fecundity of walleye pollock (*Theragra chalcogramma*) in the eastern Bering Sea. M.S. thesis, Univ. Wash., Seattle, WA 98195, 103 p.

[3] Miller, B.S., W.A. Karp, and G.E. Walters. 1978.
Pacific cod (*Gadus macrocephalus*) studies in Port Townsend Bay, Washington. Two-year Prog. Rep. FRI-UW-7813, Fish. Res. Inst., Univ. Wash., Seattle, WA 98195, 69 p.

[4] Serobaba, I.I. 1968.
Spawning of the Alaskan pollock, *Theragra chalcogramma* (Pallas) in the northeastern Bering Sea. Probl. Ichthyol. 8(6):789-798.

[5] Dunn, J.R., and A.C. Matarese. 1987.
A review of the early life history of Northeast Pacific gadoid fishes. Fish. Res. (Amst.) 5:163-184.

FIGURES

A: Blood, D.M., A.C. Matarese, and M.M. Yoklavich. 1994.
Embryonic development of walleye pollock, *Theragra chalcogramma*, from Shelikof Straight, Gulf of Alaska. Fish. Bull. 92:207-222

B: Matarese, A.C., A.W. Kendall, Jr., D.M. Blood, and B.M. Vinter. 1989.
Laboratory guide to early life history stages of Northeast Pacific fishes. NOAA Tech. Rep. NMFS 80, 652 p.

C - E: Dunn, J.R., and B.M. Vinter. 1984.
Development of larvae of saffron cod, *Eleginus gracilis*, with criteria for identification of gadid larvae in Pacific and Arctic waters contiguous to Canada and Alaska. Can. J. Fish. Aquat. Sci. 41:304-318.

F - G: AFSC.
Unpubl. Recruitment Processes, Nat. Mar. Fish. Serv., NOAA, Seattle, WA 98115-0070.