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PLATE IX. Fig. 1. Gang of (three) salmon-nets, Penobscot Bay, (p. 305,) ground plan. Scale, 60 feet to an inch. *a*, pounds; *b*, head grapple-warp; *c*, outer-pound grapple-warps; *d*, inner pounds; *e*, shear; *f*, hook; *g*, hook grapple-warp.

Fig. 2. Same as with VIII. Scale, 36 feet to an inch. Side-elevation. *b*, head grapple-warp; *c*, outer pound grapple-warp; *g*, hook grapple-warp; *h*, run; *i*, straddle-warp; *j*, spring-pole; *k*, poles; *r*, river-bed.

PLATE X. Same as VIII, (p. 305.) (Ideal perspective.)

PLATE XI. Fig. 1. Same as VIII, (p. 305.) (Ideal perspective.)

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Fig. 1. Salmon-weir, Penobscot River, No. 1, (p. 305,) ground-plan; scale 32 feet to an inch. *a*, great pound; *b*, second pound; *c*, fish-pound; *d*, leader; *f*, direction of current during ebb-tide; *g*, course of fish.

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Fig. 4. Fish-weir, Saint Croix River, (p. 294;) ground-plan. Scale, 30 feet to an inch. *a*, hedge; *b*, big pound; *c*, little pound. The arrow shows the direction of the ebb-tide current; the fish-pound is placed on the lower side of the big pound instead of the upper side as on the Penobscot.

PLATE XIII. Fig. 1. Improved pound-net of Lake Erie, (see p. 264, vol. 1;) ground-plan. Scale, 32 feet to an inch. Showing leader, heart, tunnel, and pot.

PLATE XIII. Fig. 2. Harris's Point pound, Eastport, Me. Drawn by G. B. Goode.

Fig. 3. Herring-weir, near Eastport, Me. Drawn by G. B. Goode.

PLATE XIV. Holton's fish-spawn hatchers, (p. 546 and p. 580;) patented March 18, 1873. No. 136834.

Fig. 1. Vertical central section of one case of trays. A, outer wooden case; B, open space at concave (?) bottom; C, channel around the top of case A; P, supply-pipe; *a*, pins securing trays in position; *c*, wire-cloth-bottomed trays; *c'*, upper tray; *d*, inlet-opening of supply-pipe; *f*, discharge-spout; *h*, deflector for distributing the flow of water; *i*, ledge upon which the trays rest; *n*, standards for supporting deflector; *p*, discharge-pipe for sediment and impurities; straps for lifting the trays from the case.

Fig. 2. Same; top or plan view; letters as in Fig. 1.

Fig. 3. Same; transverse sectional view of cylindrical bottom, B; letters as in Fig. 1.

PLATE XV. Clark's fish-hatching apparatus, (p. 546 and p. 582.)

Fig. 1. Plan-view of a portion of hatching-house. A, walls of hatching-house; B, an elevated water-tank; C, compartments in hatching-troughs; D, hatching-boxes, containing trays; E, trays or sieves to contain eggs; F, a perforated sheet-metal cover to hatching-boxes; G, cross-bar securing boxes in place; H, shallow trough to contain trays of eggs when removing foul matter; *a*, *a'*, faucets; *b*, water-channels or gutters; *h*, screen at outlet of water-channels.

Fig. 2. Vertical section on the line *x x*, in Fig. 1; *c*, feet to hatching-boxes; *d*, risers, elevating trays from bottom of hatching-box; *e*, small slots securing cross-bar, G; other letters same as in Fig. 1.

Fig. 3. Sectional view of cross-bar; *f*, feet of cross-bar; other letters the same as in Fig. 1.

Fig. 4. Sectional perspective of hatching-box; letters same as in Fig. 1.

Fig. 5. Perspective of water-channel; letters same as in Fig. 1.

Fig. 6. Perspective view of inverted hatching-box; letters same as in Fig. 2.

PLATE XVI. Hatching-apparatus.

Fig. 1. Sectional view of Williamson's improved double-riffle hatching-box, (pp. 547 and 585.)

Fig. 2. Perspective view of nest of trays in Williamson's improved double-riffle hatching-box.

Fig. 3. Perspective view of Clark's hatching-apparatus in operation; A, water-tank; B, perforated sheet-metal covering boxes; C, cross-bar securing boxes in place; D, troughs; E, hatching-boxes containing trays; F, trays; G, H, K, nursery-compartments for young fish; L, trays in shallow trough while removing dead eggs; M, shallow trough to contain trays when removing dead eggs; N, discharge-tube; P, waste-spout from nursery-trough.

PLATE XVII. Shad-hatching boxes.

Fig. 1. Seth Green's hatching-box, (pp. 426, 544, and 578.)

Fig. 2. Vertical section of the same.

Fig. 3. Vertical section of hatching-box of H. M. Bannister.

Fig. 4. Stilwell and Atkins's shad-hatching box, (p. 579;) figures indicate dimensions in inches.

Fig. 5. Vertical section of same.

PLATE XVIII. Illustration to paper by R. Hessel on mode of hatching adhesive eggs, (p. 567.)

Fig. 1. Perspective view of frame of box containing frames of gauge-screens; bottom, sides, and lid of box to be covered with canvas; interior frames with bottom of wire-gauge.

PLATE XVIII. Fig. 2. Plan-view of box.

Fig. 3. Plan-view of gange-screens.

Fig. 4. Perspective view of shallow pan; containing gauze-screen while depositing the eggs.

Fig. 5. Skeleton of hatching-basket.

Fig. 6. Hatching-basket plaited or wattled with juniper-boughs.

PLATE XIX. Illustrations to accompany paper by Theodore Lyman on fish-culture in brackish waters, (p. 575.)

Fig. 1. Outer side of dam; *a*, flowage-cut; *b*, waste-way.Fig. 2. Section of the dam at the waste-way; *c*, inner screen protecting outer screens from driftwood and logs; *d*, second screen with finer grating; *e*, central screen, with grating, as in Fig 4, to stop the fish; *f*, seaward screen to protect from action of waves and floating materials.

Fig. 3. Plan-view of waste-way of dam; letters same as in Fig. 2.

Fig. 4. Grating, *e*, of vertical rods and horizontal wires, full size.Fig. 5. Inner side of dam; A B, natural level of brook at low tide; C D, level of pond at low tide after dam is built; E F, level of pond at high tide, both before and after dam is built; *a*, bed of brook, outlet open; *b*, waste-way.

Fig. 6. Longitudinal section of pond; C D, level of pond at low tide after dam is built; E F, level of pond at high tide, both before and after dam is built; E, fresh water supplied from brook G; F, salt-water supplied from sea.

PLATE XX. Fish-ways in the Columbia dam, Susquehanna River, Pennsylvania, (pp. 600, 601, 604, and 610;) scale, 24 feet to an inch; intended mainly for the passage of shad.

Fig. 1. Fish-way of 1873; plan in outline.

Fig. 2. Fish-way of 1873; profile through A B of Fig. 1.

Fig. 3. Fish-way of 1866; plan in outline.

Fig. 4. Profile through C D, Fig. 3.

PLATE XXI. Inclined-plane fish-ways, (pp. 604 and 610.) The arrows show the direction of the current.

Fig. 1. The Swazey plan, invented by Alfred Swazey, of Bucksport, Me., (p. 614.)

Fig. 2. The same, with additions by C. G. Atkins, (p. 614.)

Fig. 3. The Foster plan.

Fig. 4. The same modified, as built on Penmaquan River, (p. 612.)

Fig. 5. From a design for a fish-way on Androscooggin River, August, 1870.

Fig. 6. The Brackett plan; patented by E. A. Brackett, of Massachusetts.

PLATE XXII. Plans of fish-ways, (pp. 606, 607, 610, 612.)

Fig. 1. Smith's fish-way; invented by James Smith, of Deanstone, Scotland, 1840, (p. 607.)

Fig. 2. Steck's fish-way; invented by Daniel Steck, of Pennsylvania, (p. 610.)

Fig. 3. A recent device, not tested: the slanting boards will probably assist alewives.

Fig. 4. The pool fish-way, (p. 606.)

Fig. 5. E. A. Brackett's improvement in fish-ways; patented October 22, 1872, No. 132349. 1, a vertical section: A, location of dam; B, the trough or chute inclosing way; *d*, abutments or partial bulk-heads in chute; *e*, *f*, bends or wings extending at right angles with bends or bulk-heads. 2, side-elevation: *b*², lowest water-inlet or supply-port in chute; *c*, gate for closing inlet-port; A and B, same as in 1. 3, A, B, *b*³, *c*, *d*, *e*, and *f*, same as in 1 and 2; *a*, discharge-port at lower end; *b*, *b*¹, additional inlet-ports, (p. 612.)

PLATE XXIII. Plan of Brackett's fish-way at South Hadley Falls, Mass., (p. 612.)

PLATE XXIV. Foster's fish-way at Union Mills, Saint Croix River, 1867, (pp. 613, 616.)

Fig. 1. Plan of location.

Fig. 2. Plan of fish-way; E, upper end of the fish-way, where the water enters; G, lower end of fish-way, where fish enter; H, tail-race; *a a*, side-walls of fish-way; *b b*, cross-walls or bulk-heads; *d d*, passage-ways.

Fig. 3. Same; side-elevation.

Fig. 4. Cross-section, showing shape of passage-ways; letters same as in No. 2.

PLATE XXV. Fish-way at Brownville, Me., designed by E. A. Brackett, 1873. Scale-16 feet to an inch; gradient, 1 in 10.

PLATE XXVI. Fish-ways on the Saint George River, at Warren, Me., (p. 695.) The old fish-way became useless because the fish (alewives) passed by it in the stronger current and crowded up under and near the flume *f*; the new fishway was built, and, though it was narrow and steep, great numbers of fish passed through it.

Fig. 1. *a*, dam; *b*, old fish-way; *c*, new fish-way; *d*, entrance for fish; *f*, flume; *g*, mills; Scale about 30 feet per inch.

Fig. 2. *h*, side-walls; *k*, cross-walls; *l*, curb; *l'*, another position for *l*; *m*, passage-ways; *n*, shelf. Scale about 5 feet to an inch.

Fig. 3. Section of portion of fish-way; letters same as in Fig. 2.

PLATE XXVII. Fig. 1. Smith's salmon-ladder, 1840; gradient, 1 in 7; inlet, 2 feet wide and 2 feet deep; opening between each pool, 1 foot wide; water in each pool, 15 inches deep.

Fig. 2. Fish-way (for salmon) at Balisodare, Ireland. (After Roberts.) (pp. 597-599, 605, 608.) Inclined plane; gradient, 1 in 9.

PLATE XXVIII. Brackett's fish-way, closed, perspective view, (p. 612.)

PLATE XXIX. Pike's fish-way, (p. 609.)

Fig. 1. Perspective view with portions of outer walls removed to show arrangement of interior; this view represents a fish-way with two complete circuits and a portion of a third circuit, accomplishing a total descent of about 9 feet; if the height to be surmounted were 10 feet, the outlet would be on the left-hand side.

Fig. 2. Ground-plan of Pike's fish-way; scale, 1 foot to $\frac{1}{8}$ of an inch; arrows show direction of current; A, beginning of circuit; B, end of circuit; *c, c, c*, steps, 3 inches each, the floor between the steps being level; *d, d, d*, outside walls; *f*, partition-walls.

PLATE XXX. Foster's fish-way, closed, (p. 613.)

PLATE XXXI. Common rectangular fish-way in operation, (p. 611.)

PLATE XXXII. Fig. 1. Brewer's first fish-way, (p. 606.)

Fig. 2. Brewer's second fish-way, (p. 607.)

PLATE XXXIII. Fig. 1. Cail's straight fish-way, (p. 608.) 1. Plan: E, entrance for water; O, outlet of water. 2. Section through A B.

Fig. 2. Cail's spiral fish-way, (pp. 608, 614.) The outlet is not represented, but may be made at any point by piercing the outer wall; its precise location will be determined mainly by considerations of convenience.

PLATE XXXIV. Atkins's fish-way; (p. 615.) This is a spiral arrangement of the common rectangular fish-way, with very short compartments, devised in imitation of Mr. Pike's invention. The fish are shown heading against the current, which flows as indicated by the arrows. The windows are mere apertures for the admission of light. In the plate, the walls are represented as solid if built of joist and plank, there may be an open space extending around the entire outer walls underneath each floor, which will facilitate the lighting and oversight of the interior. 1. Plan: E, inlet for water; E', second inlet, to be used when the river is too low to supply the fish-way through E. 2. Elevation.

PLATE XXXV. *Osphromenus goramy*, (old, without bands, and with gibbons forehead,) (p. 710.)

PLATE XXXVI. *Osphromenus goramy*, (p. 710.)

Fig. 1. Young, with bands.

Fig. 2. Head, with opercula removed, to show pharyngo-branchial apparatus.

Fig. 3. Section through forepart of body.

MAPS.

PLATE XXXVII. Grassy Island "Pond fishery," Detroit River. (p. 12.)

Map of the McCloud (p. 170) and Little Sacramento (p. 176) Rivers, showing the location of the United States salmon-breeding station.

Map of Lake Champlain, showing obstructions to the ascent of fish in its river-tributaries, (p. 622.)

Map of Penobscot Bay, showing location of weirs and nets, (p. 300.)

Map of Maine, showing obstructions to the ascent of fish in its rivers, (p. 617.)