

Histopathology of Atlantic salmon sampled as part of the CAHS Auditing and Survey

Pathologist = Dr. Gary D. Marty

Region/case# = assigned in the field

AHC case number = # assigned by the Animal Health Centre, Abbotsford

Slide # = same as fish number assigned by field technicians

ND = no data; NS = not scored

Scoring = none (0), mild (1), moderate (2), or severe/abundant (3);

NP = appropriate tissue not present on slide; ND = no data

"coordinates of organism" (e.g., 35.4 x 112.3) = location of a specific change on a slide; the structure/change can be found by placing the slide on the stage of the microscope in my office (AAC, room 106), with the white part on the left.

Quality Control

1 score for all organs: artifact (Art), postfixation dehydration (PFD)

1 score for each organ: Autolysis (Atly)

#	Quarterly Visit #	Reporting Period		Region	Case#	AHC Case #	
		Year	Quarter			Histopathology	slide #
2260	1	2010	Q3	ND	F-131	2010-3886	1
2261	1	2010	Q3	ND	F-131	2010-3886	2
2262	1	2010	Q3	ND	F-131	2010-3886	3
2263	1	2010	Q3	ND	F-131	2010-3886	4
2264	1	2010	Q3	ND	F-131	2010-3886	5
2265	1	2010	Q3	ND	F-131	2010-3886	6
2266	2	2010	Q3	ND	F-130	2010-3887	1
2267	2	2010	Q3	ND	F-130	2010-3887	2
2268	2	2010	Q3	ND	F-130	2010-3887	3
2269	2	2010	Q3	ND	F-130	2010-3887	4
2270	2	2010	Q3	ND	F-130	2010-3887	5
2271	2	2010	Q3	ND	F-130	2010-3887	6
2272	2	2010	Q3	ND	F-130	2010-3887	7
2273	2	2010	Q3	ND	F-130	2010-3887	8
2274	3	2010	Q3	ND	F-129	2010-3888	1
2275	3	2010	Q3	ND	F-129	2010-3888	2
2276	3	2010	Q3	ND	F-129	2010-3888	3
2277	3	2010	Q3	ND	F-129	2010-3888	4
2278	4	2010	Q3	ND	F-128	2010-3889	1
2279	5	2010	Q3	ND	F-125	2010-3890	1
2280	5	2010	Q3	ND	F-125	2010-3890	6
2281	5	2010	Q3	ND	F-125	2010-3890	7
2282	5	2010	Q3	ND	F-125	2010-3890	8
2283	6	2010	Q3	ND	F-123	2010-3891	3
2284	6	2010	Q3	ND	F-123	2010-3891	4
2285	7	2010	Q3	ND	F-122	none	
2286	8	2010	Q3	ND	F-149	2010-4159	1

2287	8	2010	Q3	ND	F-149	2010-4159	2
2288	8	2010	Q3	ND	F-149	2010-4159	3
2289	8	2010	Q3	ND	F-149	2010-4159	4
2290	9	2010	Q3	ND	F-148	2010-4160	1
2291	10	2010	Q3	ND	F-146	2010-4161	1
2292	10	2010	Q3	ND	F-146	2010-4161	2
2293	10	2010	Q3	ND	F-146	2010-4161	3
2294	10	2010	Q3	ND	F-146	2010-4161	4
2295	11	2010	Q3	ND	F-145	2010-4162	1
2296	11	2010	Q3	ND	F-145	2010-4162	2
2297	11	2010	Q3	ND	F-145	2010-4162	3
2298	11	2010	Q3	ND	F-145	2010-4162	4
2299	11	2010	Q3	ND	F-145	2010-4162	5
2300	11	2010	Q3	ND	F-145	2010-4162	6
2301	12	2010	Q3	ND	F-144	2010-4163	1
2302	12	2010	Q3	ND	F-144	2010-4163	2
2303	12	2010	Q3	ND	F-144	2010-4163	3
2304	13	2010	Q3	ND	F-136	2010-4164	1
2305	13	2010	Q3	ND	F-136	2010-4164	2
2306	14	2010	Q3	ND	F-135	2010-4165	1
2307	15	2010	Q3	ND	F-134	2010-4166	1
2308	15	2010	Q3	ND	F-134	2010-4166	2
2309	15	2010	Q3	ND	F-134	2010-4166	3
2310	15	2010	Q3	ND	F-134	2010-4166	4
2311	16	2010	Q3	ND	F-147	2010-4167	1
2312	16	2010	Q3	ND	F-147	2010-4167	2
2313	16	2010	Q3	ND	F-147	2010-4167	3

Illness Program

), acid hematin (AHT)

Most significant Lesion	Cause of Death	# fish sampled	All organ Quality control			LATly	VAC	LIP	BPH
			ART	PFD	AHT				
GLH	none	6	1	0	0	1	0	1	0
GLH	none	6	1	0	0	1	0	1	0
LFN	LFN	6	1	0	0	1	0	1	0
MKM	none	6	1	0	0	2	0	0	0
LIP	none	6	1	0	0	2	0	2	0
EPL, with fibrin	EPL, with fibrin	6	1	0	0	1	0	0	0
SSC	none	8	1	0	0	3	2	0	0
BPC	none	8	1	0	1	2	0	0	0
HEM	none	8	1	0	0	2	1	0	0
BPH	none	8	1	0	0	2	0	0	1
PMP	none	8	1	0	0	2	0	1	0
PMP	none	8	1	0	0	3	1	0	0
heart, ventricle: cor	none	8	1	0	0	1	3	0	0
PMP	none	8	1	0	1	2	0	0	0
FEN	FEN	4	1	0	1	1	0	0	0
GLT	none	4	1	0	1	1	0	0	1
GLT	none	4	1	0	0	1	1	0	0
GLT	none	4	1	0	0	0	0	0	0
HGR	HGR	1	1	0	0	1	0	0	0
PMP	none	4	1	0	0	2	0	0	0
SSF	SSF	4	1	0	0	1	1	0	0
EPL	none	4	1	0	0	3	0	0	0
IPR	none	4	1	0	0	2	0	0	0
BPC	none	2	1	0	0	0	0	0	0
BPC	none	2	1	0	0	3	0	0	0
		1	NP	NP	NP	NP	NP	NP	NP
lamina proprial con	none	4	1	0	0	2	0	0	0

GRP	none
EPL	none
IPR	none
BRS	BRS
ECH	ECH
ulcerative branchiti	ulcerative branchitis
MEN (<i>Sphaerothec</i>	MEN (<i>Sphaerotheci</i>
EPH	none
GGR, with ulcers	GGR, with ulcers
FEN	none
CPL	none
KGR	none
ECG	none
GLH	none
BHM	BHM
ENL	none
PER	none
FEN	none
MEN	none
MSC	MSC
lamina proprial con	none
disseminated prote	disseminated protei
BRS	BRS
ECH	none
MKM	none
MKM	none
BHM	none

4	1	0	0	1	0	0	0
4	1	0	0	1	1	1	0
4	1	0	0	3	0	0	0
1	1	0	0	1	1	0	0
4	1	0	0	1	2	0	0
4	1	0	0	1	3	0	0
4	1	0	0	1	3	0	0
4	1	0	0	1	3	0	0
6	1	0	0	1	0	3	0
6	1	0	0	2	0	2	0
6	1	0	1	1	0	2	1
6	1	0	1	1	0	0	1
6	1	0	1	3	0	0	1
6	1	0	0	1	2	0	0
3	1	0	0	1	3	0	0
3	1	0	0	1	3	0	0
3	1	0	0	1	0	0	0
2	1	0	0	3	0	0	0
2	1	0	0	1	1	0	0
1	1	0	1	2	0	0	0
4	1	0	0	3	0	0	0
4	1	0	1	1	0	0	1
4	1	0	0	1	1	0	0
4	1	0	0	2	0	0	0
3	1	1	0	1	0	0	0
3	2	0	0	1	1	0	0
3	1	0	0	1	1	0	0

LIVER -

VAC = vacuoles in hepatocyte cytoplasm

LIP = lipidosi

BPH = biliary preductular cell hyperplasia

LFN = focal/multifocal necrosis

BPC = basophilic cytoplasm (hepatocytes)

CPL = cholangitis/pericholangial leukocytes

PMP = pigmented macrophages

FPL = focal/multifocal parenchymal leukocytes

PVL = perivascular lymphocytes/leukocytes

SSC = sinusoidal congestion

AIB = amphophilic/eosinophilic inclusion bodies

SSF = sinusoidal fibrin

MEG = hepatocellular megalocytosis/karyomegaly

SCN = hepatocellular single cell necro

HHD = hepatocellular hydropic degen

LGR = granulomatous hepatitis/perito

LRS = *Renibacterium salmoninarum*

LPS = *Piscirickettsia salmonis*

LLS = *Loma salmonae*

Liver

[illegible]

[illegible]

sis/apoptosis
 eration
 nitis, vaccine reaction (?)

KIDNEY - HKN = head kidney
 TKN = trunk kidney
 ISH = interstitial (hematoxylin)
 TEP = tubular epithelial
 GRP = golden renal pigment
 TDI = tubular dilation (of tubules)
 MIN = mineralization
 HEM = interstitial hemorrhage
 EGC = eosinophilic granules
 IPC = intratubular (luminal) protein casts
 IFB = interstitial fibrin
 ICN = interstitial cell necrosis
 IEA = interstitial edema
 RTN = renal tubular necrosis

Liver comments	HKN	TKN	KAtly	ISH	TEP	GRP	TDI
	Y	Y	1	0	0	0	0
	N	Y	1	0	0	0	0
multiple foci of basophilic hepatocytes are probably reactive	Y	Y	0	0	0	0	0
	Y	N	0	0	NP	0	NP
	Y	Y	1	0	0	0	0
	Y	Y	1	0	0	0	0
	Y	Y	2	0	0	0	0
	Y	Y	2	0	0	0	0
	Y	Y	1	0	0	0	0
	Y	Y	1	0	NP	0	NP
	Y	Y	1	0	0	0	0
	Y	Y	2	0	0	0	0
	Y	Y	0	0	0	0	0
	Y	Y	1	0	0	0	0
	Y	Y	1	0	0	0	0
	Y	Y	0	0	0	0	0
	Y	Y	0	0	0	0	0
	N	Y	0	0	0	0	0
LGR has no organisms on Twort's Gram stain;	N	Y	1	1	1	0	0
	N	Y	1	0	0	0	0
	Y	Y	1	0	0	0	0
	Y	Y	2	0	1	0	0
	Y	Y	1	0	1	0	0
	Y	Y	0	0	0	0	0
	Y	Y	2	0	0	0	0
	NP	NP	NP	NP	NP	NP	NP
	N	Y	2	0	0	0	0

hepatocyte nuclei are arranged irregularly within hepatic cords

Y	Y	0	0	1	1	0
Y	Y	1	0	0	0	0
Y	Y	2	0	0	0	0
Y	Y	0	0	0	0	0
Y	Y	1	0	1	0	0
Y	Y	1	0	1	0	0
Y	Y	2	0	1	0	0
Y	Y	1	0	1	0	0
Y	Y	2	0	0	0	0
Y	Y	2	0	0	0	0
Y	Y	0	0	0	0	0
Y	Y	0	0	0	0	0
Y	Y	2	0	0	0	0
Y	Y	1	0	0	0	0
Y	Y	1	0	0	0	0
Y	Y	1	0	0	1	1
Y	Y	1	0	1	0	0
Y	Y	1	0	0	0	0
N	Y	1	0	0	0	0
N	Y	2	0	0	0	0
Y	Y	1	0	0	0	0
Y	Y	1	0	0	0	0
N	Y	1	0	0	1	0
Y	Y	1	1	0	0	0
Y	Y	1	0	0	0	0
Y	Y	0	0	0	0	1
Y	Y	1	0	0	0	0

- rhage/congestion
- ular cells/endothelial granules
- ial) protein casts

MGN = membranous glomerulonephritis

KGR = granulomatous inflammation

KRS = *Renibacterium salmoninarum*

KPS = *Piscirickettsia salmonis*

KLS = *Loma salmonae*

[illegible]

[illegible]

HEART -

MKM = myocardial karyomegaly/megalocytosis

EPL = epicarditis, lymphohistiocytic

EPH = epicarditis, histiocytic

ENL = endocarditis, lymphohistiocytic

ENE = endocarditis, eosinophilic

ENH = endocarditis, histiocytic

ECH = endocardial cell hypertrophy

HTH = thrombosis

HGR = granulomatous inflammation

HRS = *Renibacterium salmoninarum*

HPS = *Piscirickettsia salmonis*

HLS = *Loma salmonae*

[illegible]

[illegible]

SPLEEN -

PER = peritonitis

LKR = leukocytic karyorrhexis

PGP = parenchymal golden pigment

PFB = parenchymal fibrin

EHP = endothelial cell hypertrophy

SGR = granulomatous inflammation

SRS = *Renibacterium salmoninarum*

SPS = *Piscirickettsia salmonis*

SLS = *Loma salmonae*

HRS	HPS	HLS	Heart Comments	Spleen					
				SAtly	PER	LKR	PGP	PFB	EHP
0	0	0		0	0	0	1	0	0
0	0	0		1	0	0	1	0	0
0	0	0		0	0	0	0	0	0
0	0	0		1	0	0	1	0	0
0	0	0		2	0	0	0	0	0
0	0	0	EPL includes fibrin; Twort's Gram stain I	2	0	0	0	0	0
0	0	0		2	0	0	0	0	0
0	0	0		2	0	0	1	0	0
0	0	0		2	0	0	0	0	0
0	0	0		2	0	0	0	0	0
0	0	0		2	0	0	0	0	0
0	0	0		2	0	0	0	0	0
0	0	0	congestion of compact cortical layer, mu	0	0	0	0	0	0
0	0	0		2	0	0	0	0	0
0	0	0		1	0	0	0	0	0
0	0	0		1	0	0	1	0	0
0	0	0		0	0	0	0	0	0
0	0	0		0	0	0	0	0	0
0	0	0	HGR has no organisms on Twort's Gran	0	0	0	0	0	0
0	0	0		1	0	0	0	0	0
0	0	0		1	0	0	2	0	0
0	0	0		2	2	0	0	0	0
0	0	0		2	1	0	0	0	0
0	0	0		0	0	0	0	0	0
0	0	0		2	0	0	0	0	0
NP	NP	NP		NP	NP	NP	NP	NP	NP
0	0	0		2	0	0	0	0	0

0	0	0		0	0	0	1	0	0
0	0	0	ocus of pale basophilic cells resembles c:	1	0	0	1	0	0
0	0	0		1	0	0	2	0	0
0	0	0		0	1	0	0	0	0
0	0	0		0	2	0	0	0	0
0	0	0		1	0	0	0	0	0
0	0	0		1	1	0	0	0	0
0	0	0		1	1	0	1	0	0
0	0	0		1	1	0	1	0	1
0	0	0		1	0	0	0	0	0
0	0	0		0	0	0	0	0	0
0	0	0		0	0	0	1	0	0
0	0	0		1	1	0	0	0	0
0	0	0		1	0	0	1	0	0
0	0	0	probable <i>Kudoa</i> trophozoites @ 21 x 11	1	0	0	0	0	0
0	0	0		1	0	0	0	0	0
0	0	0		1	3	0	0	0	0
0	0	0		2	0	0	0	0	0
0	0	0		0	0	0	0	0	0
0	0	0		1	0	0	0	0	0
0	0	0		1	0	0	0	0	0
0	0	0	ventricular lumen contain several foci of	0	0	0	0	0	0
0	0	0		1	0	0	2	0	0
0	0	0		1	0	0	0	0	0
0	0	0		1	0	0	1	0	0
0	0	0		0	0	0	0	0	0
0	0	0		0	1	0	1	0	0

ent (lipofuscin)

ry (with eosinophilic granules)
ion (not SRS)
rum

INTESTINE/EXOCRINE P/

IPR = peritonitis

EPN = exocrine pancrea

MCC = mesenteric capill

FEN = fibrinocellular ent

IGR = granulomatous intl

IRS = *Renibacterium sa*

				Spleen Comments	Intestine/Exocrine			
SGR	SRS	SPS	SLS		IAtly	IPR	EPN	MCC
0	0	0	0		2	0	0	0
0	0	0	0		3	0	0	0
0	0	0	0		3	1	0	0
0	0	0	0		2	0	0	0
0	0	0	0		3	0	0	0
0	0	0	0		2	0	0	0
0	0	0	0		3	0	0	0
0	0	0	0		3	0	0	0
0	0	0	0		3	0	0	0
0	0	0	0		3	0	0	0
0	0	0	0		3	0	0	0
0	0	0	0		2	0	0	0
0	0	0	0		2	0	0	0
0	0	0	0		NP	NP	NP	NP
0	0	0	0		2	0	0	0
0	0	0	0		2	1	0	0
0	0	0	0		2	0	0	0
0	0	0	0		1	0	0	0
1	0	0	0		2	0	0	1
0	0	0	0		2	0	0	0
0	0	0	0		2	0	0	0
0	0	0	0		3	1	0	0
0	0	0	0		2	2	0	0
0	0	0	0		0	1	0	0
1	0	0	0		NP	0	0	0
NP	NP	NP	NP		NP	NP	NP	NP
0	0	0	0		3	0	0	0

ANCREAS -

is necrosis
lary congestion
eritis
flammation (not IRS)
lmoninarum

BRAIN -

BHM = hemorrhage
BCC = capillary (v)
MEN = meningitis
MSC = *Microspor*
MXA = *Myxobolus*
PMX = presporog
BGR = granuloma
BRS = *Renibacte*
BPS = *Pisciricket*
BLS = *Loma salm*

Pancreas			Intestine/Pancreas comments			
FEN	IGR	IRS		BAtly	BHM	BCC
0	0	0		1	0	1
0	0	0		1	0	0
0	0	0		1	0	0
0	0	0		1	1	1
0	0	0		2	0	1
0	0	0		2	0	0
0	1	0		2	0	0
0	0	0		2	0	0
0	0	0		2	0	2
0	0	0		2	0	2
0	0	0		2	0	0
0	0	0		NP	NP	NP
0	0	0		1	0	0
NP	NP	NP		2	0	0
2	0	0	FEN includes abundant bacterial rods;	2	0	2
0	0	0		1	0	0
0	0	0		2	0	1
0	0	0		0	1	0
0	0	0		2	0	0
0	0	0		2	0	0
0	0	0	lamina proprial congestion (1);	2	0	0
0	0	0		2	0	0
0	0	0		1	0	0
0	0	0		NP	NP	NP
NP	NP	NP		2	0	1
NP	NP	NP		NP	NP	NP
0	0	0	lamina proprial congestion (1);	2	0	0

0	0	0		2	0	0
0	0	0		2	0	0
0	0	0		2	1	0
0	0	0		1	1	0
0	0	0		2	1	0
0	0	0		NP	NP	NP
0	0	0		2	0	0
NP	NP	NP		2	0	1
1	0	0		2	0	0
1	0	0		2	1	1
0	0	0		1	0	0
0	0	0		0	0	0
0	0	0		2	0	1
0	0	0		2	1	2
0	0	0		2	3	0
0	0	0		2	0	1
0	0	0		2	0	0
2	0	0	FEN associated wtih moderate numbers of bacterial rod	2	0	2
0	0	0		2	0	0
0	0	0		2	0	1
0	0	0	lamina proprial congestion (1);	2	0	0
0	0	0		2	0	0
0	0	0		1	0	0
0	0	0		2	0	0
0	0	0		1	0	0
0	0	0		1	0	0
0	0	0		1	1	0

GLF
GLF
LSE
GLT
GGI
GRS
GLS

ge
vascular) congestion
; and/or encephalitis
idium cerebri
s arcticus
ionic myxosporean (unclassified)
atous inflammation (not MEN or BRS)
rium salmoninarum
tsia salmonis
tonae

[illegible]

[illegible]

† = lamellar hyperplasia/hypertrophy
 ¯ = lamellar fusion
 ∴ = lamellar subepithelial edema
 † = lamellar telangiectasis
 R = granulomatous inflammation (not GRS)
 S = *Renibacterium salmoninarum*
 ⚓ = *Loma salmonae*

Gill						
GLH	GLF	LSE	GLT	GGR	GRS	GLS
0	0	0	2	0	0	0
0	0	0	1	0	0	0
0	0	0	1	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	1	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	1	0	0	0
0	0	0	1	0	0	0
0	0	0	2	0	0	0
0	0	0	1	0	0	0
0	0	0	0	2	0	0
0	0	0	0	0	0	0
3	2	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
NP	NP	NP	NP	NP	NP	NP
0	0	0	0	0	0	0

[illegible]

Gill comments

GLT includes thrombosis;

lamellar thrombosis (with and without GLT), multifocal, mild;

GLT focally chronic (thrombosis and yellow pigment);

lamellar thrombosis (with and without GLT), multifocal, mild;

GLH and GLF involve one filament that also has a focus of fibrin 1 mm long and 0.5 mm wide;

lamellar thrombosis, multifocal, mild;

tips of a few lamella have small foci of bacterial rods (not considered pathogenic);

branchitis, ulcerative, with bony lysis, granulation tissue, focal, severe; no bacteria on Twort's Gra

GGR is ulcerated, with granulation tissue;

GLH focal and includes a relatively high proportion of mucous cells;

arch: branchitis, lymphocytic, focal, mild;

several vessels contain homogeneous protein with moderate numbers of bacterial rods (e.g., 19 x

40- μ m-diameter focus of basophilic structures might be *Epitheliocystis* (27.5 x 112);

m stain;

108.5);