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Ex. 280-US-461

R. Nawa

Oregon Department of Fish and Wildlife

C. Huntington

Oregon Department of Fish and Wildlife

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Stream: North Fork Sprague
Tributary to: Sprague River>Williamson River
Survey Type: Spawning Gravel
Access: Foot
Reach: 5 (partial)
Start: T36S-R14E-S3NE
Quad: Bly
Date Surveyed: 27 September 04
Surveyor: R. Nawa
Report: R. Nawa, C. Huntington
Distance Surveyed: estimated 1.1 km

Only the upper half of the reach was surveyed (Map 1). An estimated 940 m² of gravel were suitable for spawning steelhead at existing low flows (330 m² /km). An additional 320 m² of gravel would become available at bankfull flows (170 m² /km). The relatively coarse gravel/cobble substrate would also be suitable for Chinook salmon (Photo 457). Cobble embeddedness ranged from 30-50 percent. Gravel was concentrated below meander bends where the channel was sinuous.. The unsurveyed lower portion of the reach had a straight channel. No spawning gravel was apparent for at least 100 m in the straight channel below where the survey began. Beaver had dammed one side channel near the Ganong residence.

Photo 457. Coarse
gravel/cobble substrate
would be suitable for
Chinook salmon spawning.

Stream: North Fork Sprague
Tributary to: Sprague River>Williamson River
Survey Type: Spawning Gravel
Access: Foot
Reach: 6
Start: T35S-R14E-S35NE
Quad: Bly
Date Surveyed: 27 September 04
Surveyor: R. Nawa
Report: R. Nawa, C. Huntington
Distance Surveyed: 1.42 km

The upper half of the reach was Forest Service; the lower portion was private (Map 1). Carry and Ralph Ganong provided access to private lands. Cobble and poorly sorted gravel dominated the channel (Photo 454). An estimated 4 m² of gravel were suitable for spawning steelhead at existing low flows (3 m²/km). Lack of suitable spawning gravel may be related to low sinuosity. Wetted width was about 15 m. An unscreened diversion ditch immediately below Forest Road 3411 diverts about 70 percent of the North Fork flow (Map). Greatly reduced flow in the North Fork would make adult salmon migration difficult. Stream temperature at the upper end of reach was 9.4°C at 1400.

Photo 454. Coarse cobble/ boulder substrate is unsuitable for spawning salmon and steelhead.

Stream: North Fork Sprague
Tributary to: Sprague River > Williamson River
Survey Type: Spawning Gravel
Access: Foot
Reach: 7 (partial)
Start: T35S-R14E-S36NW
Quad: Bly, Campbell Reservoir
Date: 27 September 04
Surveyor: R. Nawa
Distance Surveyed: estimated 1.3 km

Only the lower half of the reach was surveyed (Map 1). The stream was in a very steep walled canyon with cobble/boulder substrate (Photo 449). Small patches of gravel were occasionally found behind large boulders. An estimated 16 m² of gravel were suitable for spawning steelhead at existing flows (12 m²/km). This reach has little potential for spawning, but would provide excellent holding water for adults because of high flows, cold water (9.4°C) and inaccessibility. Bankfull flow made wading treacherous.

Photo 449. Coarse cobble/boulder substrate was unsuitable for salmon and steelhead spawning.

Stream: North Fork Sprague
Tributary to: Sprague River>Williamson River
Survey Type: Spawning Gravel
Access: Foot
Reach: 14
Start: T34S-R16E-S30NW
Quads: Sandhill Crossing, Lee Thomas Crossing
Survey Date: 26 September 04
Surveyor: R. Nawa
Report: R. Nawa, C. Huntington
Distance Surveyed: 5.3 km

The entire reach was Freemont National Forest lands (Map 2). Low stream gradient and high sinuosity resulted in large amounts of mostly well sorted spawning gravel. An estimated 3,850 m² of gravel were suitable for steelhead spawning at existing low flows (732 m²/km). An additional 424 m² of gravel would become available at bankfull flows (81 m²/km). The median gravel size (D50) was 16-32 mm (Wolman Pebble Count). Fresh deposition on point bars indicates significant amounts of sediment moving through the system (Photos 442,443). An estimated 10-30 percent of the spawning gravel was sand. At 2 locations boulders were 40-80 percent embedded in fine gravel. Eroding streambanks were heavily grazed in meadow areas resulting in a lack of shade (few willows). The active channel was 4-8 m wide. Stream temperature was 13.3° C at 1630 pdt.

Photo 442. Well sorted spawning gravel deposited at point bars associated with meander bends.

Photo 443. Gravel/cobble suitable for both steelhead and Chinook salmon

Stream: North Fork Sprague River
Tributary to: Sprague River>Williamson River
Survey Type: Spawning Gravel
Access: Foot
Reach: 15
Start: T34S-R16E-S20NW
Quads: Sandhill Crossing, Lee Thomas Crossing
Date Surveyed: 26 September 04
Report: R. Nawa, C. Huntington
Surveyor: R. Nawa
Distance Surveyed: 1.7 km

This reach is a private meadow within the Freemont National Forest (Map 2). Low stream gradient and high sinuosity resulted in large amounts of mostly well sorted spawning gravel in riffles (Photo 432). An estimated 1,154 m² of gravel were suitable for steelhead spawning at existing low flows (695 m²/km). An additional 352 m² of gravel would become available at bankfull flows (212 m²/km). The median gravel size (D50) was 16-32 mm (Photo 434; Wolman Pebble Count). Estimated embeddedness was 10-20 percent. In some locations the gravels were heavily cemented or were surficial deposits < 15 cm deep over a claypan. These thin layers of gravel were judged unsuitable. Streambanks were only lightly grazed and seemed to be recovering. The active channel was 8 m. Stream temperature was 6.6° C at 1130.

Photo 432.
Large amounts
of well sorted
gravel were in
riffles.

Photo 434.
Median gravel
size was 16-32
mm.

Stream: North Fork Sprague River
Tributary to: Sprague River>Williamson River
Survey Type: Spawning Gravel
Access: Foot
Reach: 16A
Start: T34S-R16E-S20NE
Quad: Lee Thomas Crossing
Date: 26 September 04
Surveyor: K. Hartzell
Report: R. Nawa, C.Huntington
Distance Surveyed: 0.4 km

This reach is on Freemont National Forest (Map 2). An estimated 382 m² of gravel/cobble was suitable for steelhead spawning at existing low flows (955 m²/km). Estimated sand content in gravel patches was 25 percent.

Photo 90.
Meandering low
gradient stream
had a high density
of spawning
gravel .

Stream: North Fork Sprague River
Tributary to: Sprague River>Williamson River
Survey Type: Spawning Gravel
Access: Foot
Reach: 16B
Start: T34S-R16E-S20SE
Quad: Lee Thomas Crossing
Date: 26 September 04
Surveyor: K. Hartzell
Report: R. Nawa, C.Huntington
Distance Surveyed: 3.8 km

This reach is on Freemont National Forest land upstream of School Creek (Map 2). An estimated 217 m² of gravel/cobble was suitable for steelhead spawning at existing low flows (57 m²/km). Estimated sand content in gravel patches was 25 percent. Estimated embeddedness was 30 percent.

Photo 93. Source of spawning gravel appears to be from local streambank erosion.

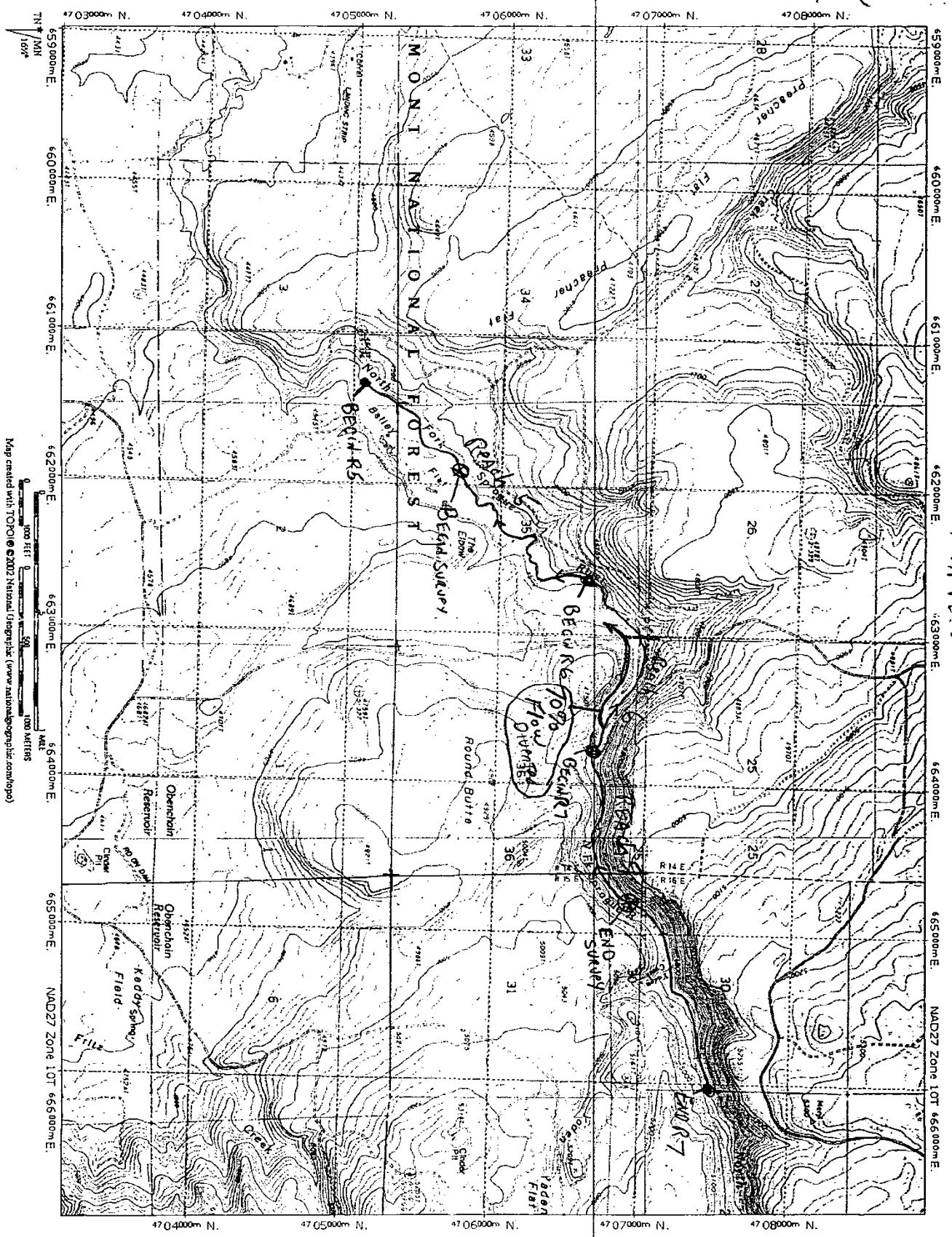
Stream: North Fork Sprague River
Tributary to: Sprague River>Williamson River
Survey Type: Spawning Gravel
Access: Foot
Reach: 16C
Start: T34S-R16E-S28SW
Quad: Lee Thomas Crossing
Date: 26 September 04
Surveyor: K. Hartzell
Report: R. Nawa, C.Huntington
Distance Surveyed: 3.8 km

This reach is on Fremont National Forest land upstream of Dead Cow Creek (Map 2;Photo 96). An estimated 165 m² of gravel was found suitable for steelhead spawning at existing low flows (57 m²/km). Estimated sand content in gravel patches ranged from 25-40 percent. .

Photo 96. Upstream
view of Dead Cow
Creek and North Fork.

Reach 5, 6, 7

Lower N. Fork Spigawie



MAR 10 12

Map created with TOPO © 2002 National Geographic (www.nationalgeographic.com/topo)

SPAWNING HABITAT FORM

Stream North Fork Sprawl Reach 14 Date 26 SEPT 04
 Surveyor(s) R. NAWA

Surface area (m ²)	Class (G, GC, C)	Percent wetted	Percent usable	% SAND	COB Emb	Comments
32	G	100	80	20	N.D.	BANK SAND HILL CROSSING RO
70	G	70	50			
60	G	100	90			
20	G	100	80			
30	G	100	80			
40	G	80	50			
30	G	60	40			
200	G	100	70			
40	G	90	60			
60	G	100	80			
70	G	60	40			
35	G	80	60			
80	GC	90	60			
35	G	80	60			
88	G	90	60			
300	G	70	50			
90	GC	90	60			
16	G	100	80			
80	G	60	40			
12	G	60	40			
30	GC	80	60			
48	G	100	100			
50	G	100	80			
40	GC	100	100			
120	G	100	80			
64	G	100	80			
100	G	100	60			BUDS EMBEDDED 40-80%
64	G	100	80			
40	G	100	80			WW DECREASES TO 4m
30	GC	100	100			
80	GC	100	80			
12	GC	100	60			56° @ 1630
10	GC	100	100	✓	✓	

2,455

Class: G= gravel; C= small cobble (<150mm [6"])

Usable habitat is at least 150mm (6") deep and has water velocities between 1 and 4 feet/second.

SPAWNING HABITAT FORM

Stream North Fork SPRAGUE Reach 14 (USFS) Date 26 SEPT 04
 Surveyor(s) R. NAWA $4,663 \text{ m}^2 / 3.27 \text{ miles} = 1426 \text{ m}^2 / \text{mile}$

Surface area (m ²)	Class (G, GC, C)	Percent wetted	Percent usable	% SAND	Cob Emb	Comments
20	GC	100	100	20	N.D	"CONRAD PLANE" TRIB SEC
60	G	100	60	30		
16	G	90	40	—		
30	G	80	60	20		
300	G	95	80	30		GLIDE
12	G	100	80	—		SCATTERED AMONG BOULDER
64	G	100	70	20		
54	G	100	80	20		BOULDER EMBRG = 60%
40	G	40	30	10		
150	G	70	50	20		
32	G	80	50	20		
64	GC	100	90	20		
72	G	80	40	20		
100	G	100	40	20		ROAD CROSSES CREEK - NO BRIDGE
70	GC	90	40	20		
20	GC	100	30	20		
30	G	100	60	20		
200	GC	90	70	20		
36	G	80	50	20		
45	G	100	40	20		
40	GC	100	60	20		
30	GC	100	70	20		
40	G	100	70	30		
50	GC	90	60	30		
20	G	80	70	20		
50	G	100	60	20		
80	GC	100	60	20		
40	GC	100	80	20		
20	G	100	100	30	10-20	
14	G	100	40	30	N/D	
50	G	100	20	30		
8	G	100	100	30		
65	G	90	70	30		

14 22.

Class: G= gravel; C= small cobble (<150mm [6"])

Usable habitat is at least 150mm (6") deep and has water velocities between 1 and 4 feet/second.

SPAWNING HABITAT FORM

Stream N. Fork Sprague Reach 16-A, 16-B Date 9/26/04
 Surveyor(s) Hartzell

Surface area (m ²)	Class (G, GC, C)	Percent wetted	Percent usable	90 Sand	Start @ USFS P.L. Reach 16-A, Comments	
4	G	100	100	25	Start @ USFS P.L. Reach 16-A, 3676153, 4719034	
6	G/C		20	20		
45	G/C		30	20		
48	G/C		80	25		
18	G/C		60	25		
15	G/C		50	25		
8	G/C		90	20		
20	G/C		60	25		
12	G/C		50	25		
16	G/C	✓	50	25		
Rd. 3372 Bridge						
12	G/C	100	80	25		
48	G/C		20	25		
60	G/C		20	25		
30	G/C		50	25		
16	G/C		50	25		
24	G	✓	100	20	Primo Gravel From School Cr., Start R-16A	
2	G/C	100	80	25		
12	G/C		20	30		
3	G/C		80	25		
10	G/C		90	25		
8	C		90	—	30% Embed	
10	G		20	25		
8	G/C		90	25		
18	G/C		100	25		
30	G/C		50	25		
9	G/C		80	25		
12	G/C		30	25		
6	G/C		100	25		
3	C		100	—	30% Embed	
9	G/C		100	40		
6	G/C	✓	100	25		

Gravel predominates in all areas called a G/C combination

Class: G= gravel; C= small cobble (<150mm [6"])

Usable habitat is at least 150mm (6") deep and has water velocities between 1 and 4 feet/second.

SPAWNING HABITAT FORM

Stream N. Fork Sprague Reach 16B, 16C Date 9/26/04
 Surveyor(s) Hartzell

Surface area (m ²)	Class (G, GC, C)	Percent wetted	Percent usable	90% Sort	Comments
4	G	100	70	30	0677492, 4717550
					Rd. 3411 Bridge > 20 m
					S is now Primary Chan.
10	GC	100	70	25	for Dead Cow Cr.
12	GC		50	25	
36	GC		70	25	
21	GC	✓	70	25	
					Dead Cow Cr. Original
					Channel as shown on map
					Begin Reach 16C
2	G	100	60	30	0677602, 4717347
6	GC		20	30	
5	GC		100	25	
5	GC		100	30	
6	GC		100	30	
30	G		60	40	
6	G		100	40	
3	G		40	40	
12	GC		90	20	
8	G		100	25	
12	G		60	30	
16	G		100	25	
4	GC		100	25	
21	G		70	35	
9	G		30	30	
20	GC	✓	100	40	
					USFS Fenceline: End R.
					0677662, 4716777
					50°F @ 1645

Gravel predominates in all areas called a G-C combination

Class: G= gravel; C= small cobble (<150mm [6"])
 Usable habitat is at least 150mm (6") deep and has water velocities between 1 and 4 feet/second.

Stream Name Noath Fork Spruce Rosgen Channel Type C
 Hydrologic Unit BB* Reach 15 EPA EXT _____
 Stream Survey Reach _____ Sample # 1 Habitat Unit Type _____ Fast/Slow Water _____
 Observers R. NAWA Date _____
 Procedure (Wolman, 1954) _____ (Beverger and King, 1995) _____ Other _____
 Measurement Device Ruler Gravelometer (FISP US SA-97)

Class Name	Particle Size (mm)	Dot Count	Total #	% Total	Cum. #	Cum %
Small Organic	< 25 mm					
Large Organic	> 25 mm					
Clay	<0.0039					
Silt	0.0039-0.0625					
Fine Sand	0.0625 - 0.25					
Med. Sand	0.25 - 0.5					
Coarse Sand	0.5 - 1.0					
VC Sand	<u>P-2</u>		<u>7</u>			
VF Gravel	2 - 4		<u>0</u>			
Fine Gravel	<u>4 - 8</u>		<u>1</u>			
Fine Gravel	6 - 8					
Med. Gravel	<u>8 - 16</u>		<u>7</u>			
Coarse Gravel	<u>16 - 32</u>		<u>37</u>			
VC Gravel	<u>32 - 64</u>		<u>45</u>			
Sm. Cobble	<u>64 - 128</u>		<u>5</u>			
Lg. Cobble	128 - 256					
Sm. Boulder	256 - 512					
Med. Boulder	512 - 1024					
Lg. Boulder	1024 - 2048					
VL Boulder	2048 - 4096					
Bedrock						

Total #: 102

Calculations: % Fines <2mm _____ % Fines <6mm _____ D50 _____ D84 _____
 Notes: UTM = 676687 - 4719083 Active channel = 6.9 m

Stream Name NORTH Fork SPRUCE Rosgen Channel Type C
 Hydrologic Unit _____ ~~EPA~~ Reach 14 EPA EXT _____
 Stream Survey Reach _____ Sample # 1 Habitat Unit Type _____ Fast/Slow Water _____
 Observers R. Ngura Date 26 SEPT 04
 Procedure X (Wolman, 1954) _____ (Beverger and King, 1995) _____ Other _____
 Measurement Device _____ Ruler _____ Gravelometer (FISP US SA-97)

Class Name	Particle Size (mm)	Dot Count	Total #	% Total	Cum. #	Cum %
Small Organic	< 25 mm					
Large Organic	> 25 mm					
Clay	<0.0039					
Silt	0.0039-0.0625					
Fine Sand	0.0625 - 0.25					
Med. Sand	0.25 - 0.5					
Coarse Sand	0.5 - 1.0					
VC Sand	0 - 2		5	5		
VF Gravel	2 - 4		0			
Fine Gravel	4 - 8		5	5		
Med. Gravel	8 - 16		11	11		
Coarse Gravel	16 - 32		36	36		
VC Gravel	32 - 64		39	39		
Sm. Cobble	64 - 128		4	4		
Lg. Cobble	128 - 256					
Sm. Boulder	256 - 512					
Med. Boulder	512 - 1024					
Lg. Boulder	1024 - 2048					
VL Boulder	2048 - 4096					
Bedrock						

Total #: 100

Calculations: % Fines <2mm _____ % Fines <6mm _____ D50 _____ D84 _____
 Notes: AC = 8.1m CLIC UTM = 625056 - 4719260

Reach 14

PHOTO RECORD

PAGE: 1 OF 1

STREAM: North Fork Sprague SURVEY TYPE: OR. PLAN BASIN MIXED

BASIN OR GCG: Reach 14, 15, 16 A, B, C FILM: DIGITAL SLIDE PRINTS

SURVEY CREW: R. Nowak / K. H. ROLL #: _____ MAILER #: _____

PHOTO # OR DIGITAL ID	UNIT #	DATE	TIME	STREAM / PHOTO DESCRIPTION
1: B 444	14	26 Sept 04	1640	Close up of freshly deposited gravel on point bar
2: B 443	14		1650	Close up of gravel texture
3: B 442	14		1500	Gravel Deposition AT Point Bar
4: B 441	14		1510	Stream lacks shape in meadows
5: B 440	14		1500	Excellent gravel deposited above fallen tree
6: B 429	14		1450	Poor section BDR Embedment = 70% - NOT COUNTED
7: B 430	14		1430	Wolman pebble count site
8: B 437	14		1410	Downstream into USFS - No willows same bank erosion
9: B 436	15		1410	Upstream Private - willows recovering
10: B 435	15		1350	Cemented gravel being eroded from bank
11: B 434	15		1310	Close up of clean gravel
12: B 433	15		1310	Riffle with 100 m ² gravel
13: B 432	15		1250	130 m ² spawning gravel in low gradient riffle
14: B 431	15		1210	Spawning gravel close up - Lamprey redds?
15: B 430	15		1120	Wolman pebble count
16: B 429	15		1100	Downstream into private land - Lee Thomas meadow
17:				
18: C 90	16A		1113	US View of FS Land w/ Rich
19:	16A			US View of channel
20:	15			DS View of channel w/ Rich
21:	16B		1450	US View of eroded bank
22:	16B		1450	DS View of meanders 0677502, 4717713
23:	16B		1535	DS View
24:	16C			US View of Dead Cow Cr (Original channel)
25:	16C			US View from reach break
26:	16B		1557	Side channel riffle & spawning gravel
27:	17		1652	US View of willowless private land
28:	17			US View of private land & house
29:	16C			DS View at reach break
30:	16B		1715	US View of New Dead Cow Cr. channel (20m south of bdy)
31:	16B		1715	DS View of rd 3411 bridge
32:	16B		1725	US View of meanders Fork Lava Outcrop
33:	16B		1725	DS View of meanders " " "
34:	16B		1750	US View of School Creek & Gravel
35: C107	16B		1750	US View of School Cr. Inflow
36:				
37:				
38:				
39:				
40:				

PHOTO RECORD

PAGE: _____ OF: _____

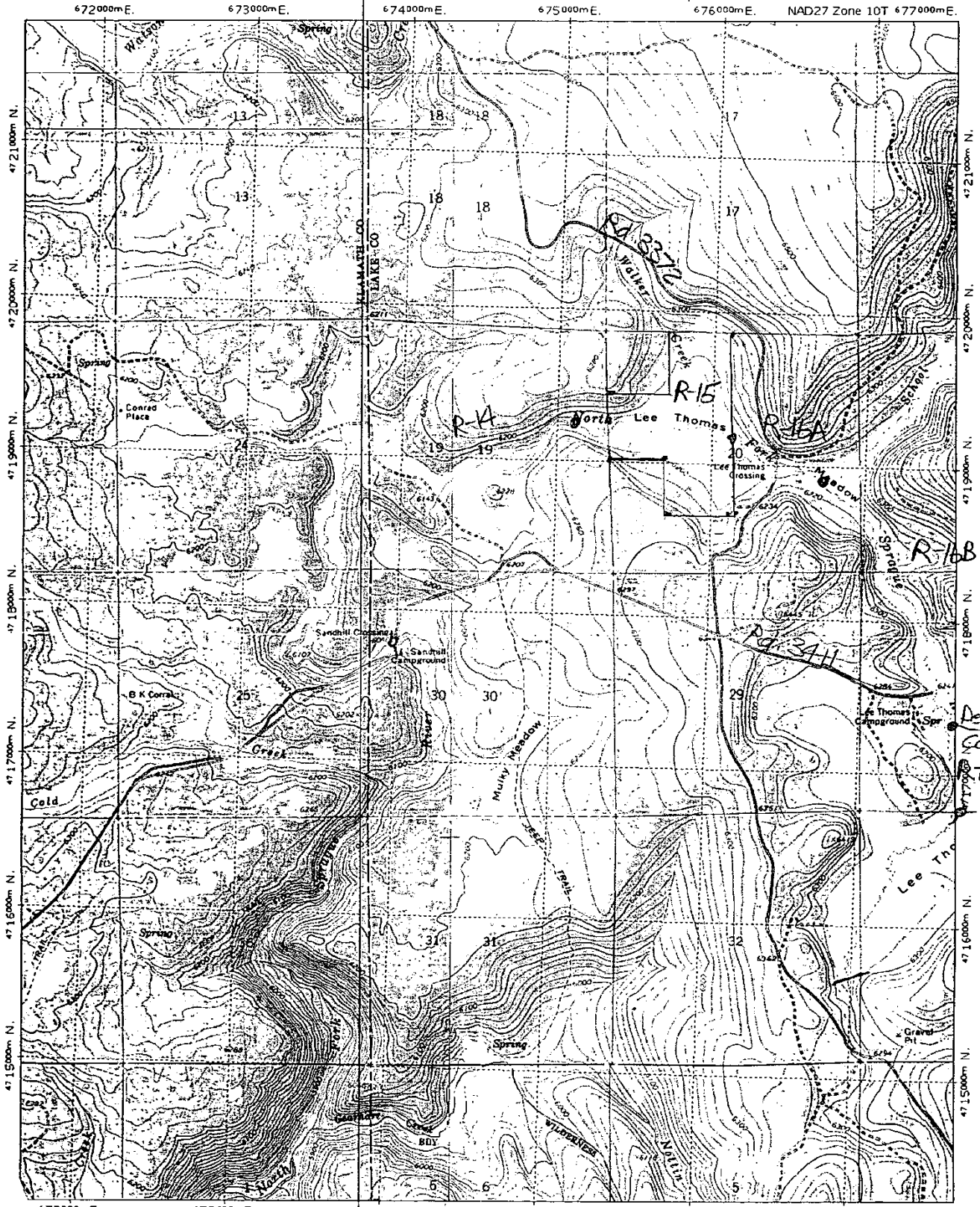
STREAM: _____ SURVEY TYPE: OR. PLAN BASIN MIXED

BASIN OR GCG: _____ FILM: DIGITAL SLIDE PRINTS

SURVEY CREW: _____ ROLL #: _____ MAILER #: _____

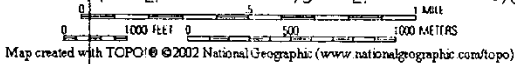
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Middle N. Fork Sprague



672000m E. 673000m E. 674000m E. 675000m E. 676000m E. NAD27 Zone 10T 677000m E.
 4715000m N. 4716000m N. 4717000m N. 4718000m N. 4719000m N. 4720000m N. 4721000m N.

MIN	16A	0.25M
X*	16B	2.35M
	16C	0.60M
		7721M



Map created with TOPO! © 2002 National Geographic (www.nationalgeographic.com/topo)

PHOTO RECORD

PAGE: 1 OF 1

STREAM: North Fork Sprague SURVEY TYPE: OR. PLAN BASIN MIXED
 BASIN OR GCG: Reach 5, 6, 7 Sprague FILM: DIGITAL SLIDE PRINTS
 SURVEY CREW: R. NAWA ROLL #: _____ MAILER #: _____

PHOTO # OR DIGITAL ID	Reach #	DATE	TIME	STREAM / PHOTO DESCRIPTION
1: B 451	5	27 MAY 04	1525	Suitable gravel cobble substrate Found in R5 suitable for Clunk
2: B 456	6		1515	Downstream - private
3: B 455	6		1515	upstream - forest salvage
4: B 454	6		1455	cobble boulder substrate unsuitable for spawning
5: B 453	6		1445	Downstream cobble boulder substrate
6: B 452	6		1435	diversion dam with natural bypass at LB
7: B 451	6		1430	unscreened diversion takes 70% flow
8: B 450	6		1400	"Bogin Reach 6" working downstream
9: B 445	7		1030	mid channel bar - cobble boulder unsuitable for spawning
10: B 446	7		1030	370 gradient culvert R0341 - possible barrier at Arch sp. flow
11: B 447	7		1140	3-4% gradient cobble boulder riffles & cascades
12: B 448	7		1120	colluvial canyon dominated by boulders & cobble
13: B 449	7	↓	1145	cobble boulder substrate unsuitable for spawning
14:				
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PHOTO RECORD

PAGE: _____ OF: _____

STREAM: _____ SURVEY TYPE: OR. PLAN BASIN MIXED

BASIN OR GCG: _____ FILM: DIGITAL SLIDE PRINTS

SURVEY CREW: _____ ROLL #: _____ MAILER #: _____

PHOTO # OR DIGITAL ID	UNIT #	DATE	TIME	STREAM / PHOTO DESCRIPTION
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