UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

10,000-FOOT STATE GRID TICKS......

(15 meters north and 78 meters east)

Federal or State reservations shown on this map

VERTICAL DATUM......NATIONAL GEODETIC VERTICAL DATUM OF 1929

To place on the predicted North American Datum of 1983,

move the projection lines as shown by dashed corner ticks

There may be private inholdings within the boundaries of any

No distinction made between houses, barns, and other building

Location Map

Adjoining 7.5' Quadrangles

1179 15' 00" 1179 00' 00" 1169 52' 30" 1169 45' 00"

Palouse, WA Potlatch, ID Princeton, ID

Viola, WA

........... 1927 NORTH AMERICAN DATUM

Sanders, 1D

PROVISIONAL MAP

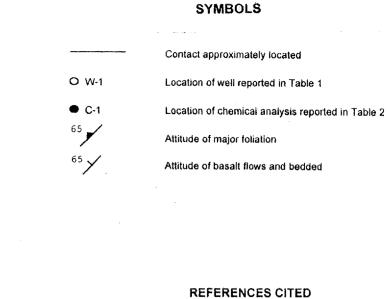
Produced from original

manuscript drawings. Infor-

mation shown as of date of

1990 MAGNETIC NORTH DECLINATION.

T-99-6. Bedrock Geologic Map of the Potlatch Quadrangle, Latah County, Idaho, by Chris H. Duncan and John H. Bush, 1999, scale



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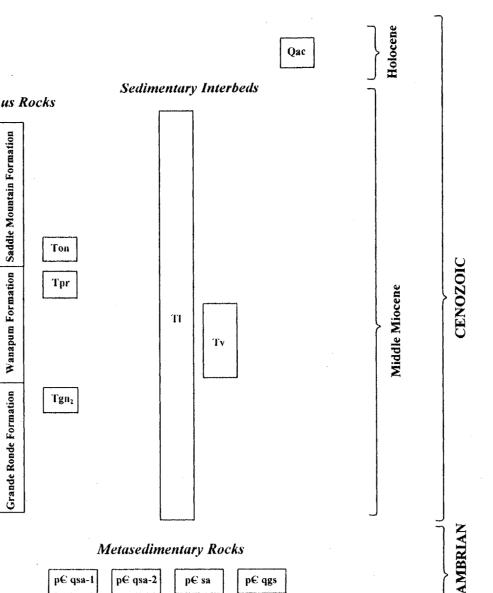
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Correlation of Map Units

POTLATCH QUADRANGLE IDAHO-LATAH CO.

7.5 MINUTE SERIES (TOPOGRAPHIC)

Interstate Route CU. S. Route C State Route

POTLATCH, IDAHO

PROVISIONAL EDITION 1990

46116-H8-TF-024

Geologic base map: U.S.G.S. 7.5' quadrangle of Palouse, WA

several different units including Precambrian pre-Belt Supergroup, Belt Supergroup, metamorphosed Belt Supergroup, Cambrian metasediments, Cretaceous metamorphosed, and unmetamorphosed Idaho batholith rocks (Tullis, 1940, 1944, Bond, 1978, Griggs, 1973, Swanson rocks. On the Potlatch quadrangle four Precambrian units are delineated, three of which were determined to belong to the Belt Supergroup.

SURFICIAL DEPOSITS ALLUVIUM AND COLLUVIUM (Holocene)--Stream and slope wash deposits. Compositions variable; commonly reworked loess and basalt with resistant quartz fragments from nearby

granitoid and metasediment outcrops. Drainages have not totally adjusted to basalt emplacement. On the Potlatch quadrangle Deep Creek is controlled by the distal edge of the wide alluvial plain and joins the Palouse River at a right angle.

ONAWAY MEMBER (Miocene)--Fine-grained, dark-colored basalt with lath-shaped plagioclase phenocrysts that average 1 cm but may exceed 5 cm in length. In places the basalt contains a mapping throughout Latah County shows that the Onaway should be placed in the Saddle Mountains Formation (Bush and others, 1995, and Bush and Priebe, 1998). the uppermost Priest Rapids. The primary downstream terminus of the Onaway Member is

COLUMBIA RIVER BASALT GROUP: WANAPUM FORMATION PRIEST RAPIDS MEMBER (Miocene)--Medium to coarse-grained basalt with microphenocrysts of plagioclase and olivine in a groundmass of intergranular pyroxene, ilmenite blades, and minor devitrified glass. Other workers have previously identified and described these flows (Wright and others, 1973, 1979, and Swanson and others, 1977, 1979b). The flows have reversed geomagnetic polarity (Wright and others, 1973, and Swanson and others, 1979b). These basalts are exposed in quarries and road cuts throughout the west-central and western parts of the

> type and two are the Rosalia chemical type of Wright and others (1973, 1979). Similar to the Pullman area to the south (Hooper and Webster, 1982), the Lolo chemical type underlies much of the area and the Rosalia chemical type occurs as scattered outcrops. COLUMBIA RIVER BASALT GROUP: GRANDE RONDE FORMATION

Swanson and others (1980), Hopper and Webster (1982) and Gullick (1994) all show the upper most flows (n2-normal polarity, second chemical type) of Grande Ronde beneath the Priest Rapids on nearby quadrangles. Structural contour maps by Sawnson and others (1980) and Heinemann (1994) estimate the top of Grande Ronde to occur at 2250 feet in elevation beneath the city of Palouse. On the basis of basalt reported in deep wells near Potlatch (Kirkham, 1927) the Grande Ronde interpreted to extend into the central portion of the Potlatch quadrangle (Cross-section A-B and Plate 3, cross-section C-D-E). LATAH FORMATION

is not improper to use the term on the eastern edge of the basin where it is part of the Latah Formation. Where the sediments are not bounded by the Wanapum and Grande Ronde the more encompassing terms Latah Formation (TI) or Latah interbeds should be used.

PRE-BASALT ROCKS QUARTZITE, GNEISS AND SCHIST (Precambrian) -- Consists of interlayered units of quartzite, schist, and gneiss. The quartzite is white to creamy white, light-gray to bluish-purplish-gray, pink, and reddish-brown. It consists primarily of recrystallized quartz with small grains and crystals of feldspar, muscovite, and biotite. The quartzite is massive bedded and has been recrystallized, but inconspicuous relict bedding planes and laminations are present in places. The quartzite forms the tops of ridges and buttes. Generally, the less resistant gneiss and schist crop out rarely in road cuts and exposures at lower elevations. The schist and gneiss are thinly banded and are mineralogically simple consisting primarily of quartz, feldspar, muscovite and biotite. Locally, there are small exposures or displaced fragments of calc-silicate and other more mineralogically complex metamorphic rocks. Many of the numerous buttes on surrounding quadrangles in western Latah and eastern Whitman counties are capped with quartzite. A few of these are Tomer, Kamiak, Randall, Parker, and Angel buttes. There has not been an accepted stratigraphic framework presented for these quartzite units (Savage, 1973, Hooper and Webster, 1982, and Webster and Nunez, 1982). In places, these units are "roof pendants" over an intrusive core where contact or subsequent

> This unit can be mapped onto the southeastern part of the quadrangle where it appears to grade into argillite, siltite and quartzite units that appear to belong to the Belt Supergroup. However, the lack of exposure and proximity of the underlying intrusive rocks makes this interpretation difficult to substantiate. In addition, the change in metamorphic character occurs across a zone in which

BELT SUPERGROUP QUARTZITE, SILTITE AND ARGILLITE-1 (Precambrian)--Consists primarily of quartzite with minor siltite and argillite. The quartzite is somewhat similar to the quartzite on the southern end of the quadrangle (p∈qsa-2) but is not as recrystallized. The unit is best exposed in small quarries in the northern part of the quadrangle. Outcrops are poor and dominated by quartzite, but in places light colored argillite and siltite are interbedded with the quartzite. Griggs (1973), who mapped the Belt Supergroup rocks from northern Idaho and northeastern Washington into

QUARTZITE, SILTITE AND ARGILLITE-2 (PRECAMBRIAN).-Consists of interbedded quartzite, siltite, and minor argillite. Ripple marks, cross-beds, and fine laminations are common. The quartzite is light-gray, medium to massive bedded and well indurated. Quartzite is more common than in the p∈qsa-1 unit. The p∈qsa-2 unit belongs in the Belt Supergroup but correlation to a specific stratigraphic horizon without additional regional mapping is not yet possible. The best

exposures of this unit occur on the adjoining southwestern edge of the Princeton, ID quadrangle.

Vertical Scale (2x horizontal) 1:12,000

Horizontal Scale 1:24,000

Note: Loess (Ql) shown only on cross-section

SILTITE AND AGILLITE (PRECAMBRIAN)--Consists of alternating light-gray siltite and dark-gray argillite laminations and microlaminations. Exposure of this unit occurs along Flannigan Creek and just east of the quadrangle boundary; where it is shown on the edge of the Potlatch quadrangle even though its aerial extent into the quadrangle is not known. The laminations and microlaminations of the siltite-argillite unit are typical of the Belt Supergroup throughout nearby northern Idaho and are very similar to argillitic units of the Wallace Formation. Based on lithologic similarity this unit is correlated to the Precambrian Belt Supergroup, but correlation to

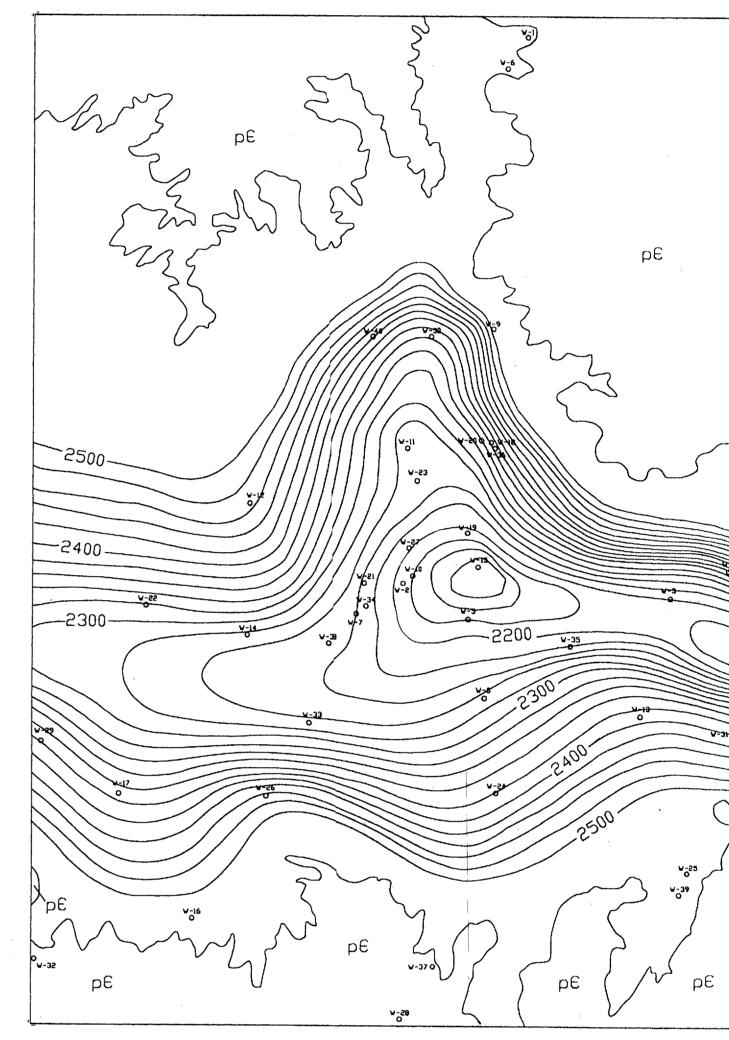
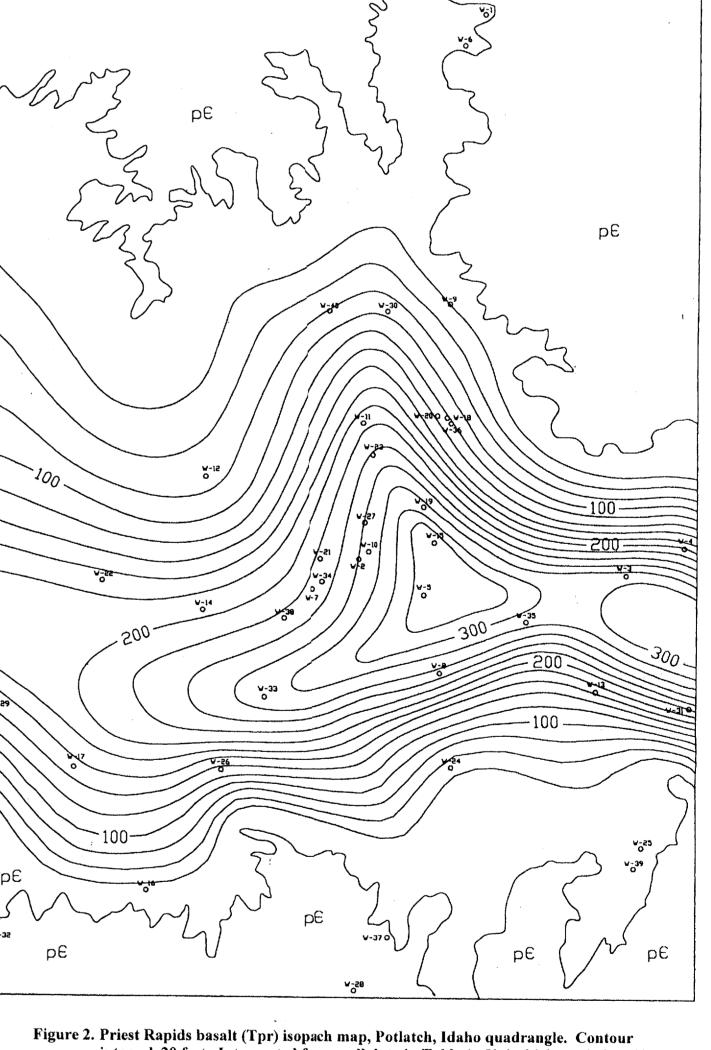


Figure 1. Priest Rapids basalt (Tpr) structural contour map of the base contact, Potlatch. Idaho quadrangle. Contour interval, 20 feet. Interpreted from well data in Table 1. Elevations above 2500 feet are not shown due to extensive colluvium and loess deposits masking surface basalt contacts.



interval, 20 feet. Interpreted from well data in Table 1. Unit thickness below 40 feet is not shown due to extensive colluvium and loess deposits masking surface basalt contacts.

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		Qac	Holocene	
ne	ous K	Sedimentary Interbeds locks]	
dno	Saddle Mountain Formation	Ton		
Columbia River Basalt Group	Wanapum Formation	Tpr Ti Tv	Middle Miocene	CENOZOIC
ပီ	Grande Ronde Formation	Tgn ₁		
		Metasedimentary Rocks [p€ qsa-1] [p€ qsa-2] [p€ sa [p€ qgs]		PRECAMBRIAN
		INTRODUCTION		
		The bedrock map of the Potlatch quadrangle represents a compilation water well data (Table 1) and additional field work. Distribution of the P was not illustrated in order to produce a bedrock map. Bedrock outcome percent of the area and therefore all contact lines are interpretable.	alouse Forma	tion loess

one percent of the area and therefore all contact lines are interpretative. Contacts between prebasalt units and the Columbia River Basalt Group (CRBG) are especially difficult to determine because of thick overburden and lack of well data in places. Regional maps by Tullis (1940), Griggs (1973), Rember and Bennett (1979), Swanson and others (1977, 1979a and 1980), and Gullick (1994) were used in the compilation. The basalt chemistry (Table 2) was analyzed by the GeoAnalytical Laboratory at Washington State University.

Basement (pre-basalt) rocks here and on the surrounding quadrangles have been mapped as and others, 1980, Rember and Bennett, 1979, and Hooper and Webster, 1982). Gullick (1994) placed the non-intrusive rocks into pre-Cretaceous metasedimentary units. Bush and others (1998a), for the adjoining Robinson Lake quadrangle to the south, place part of these rocks in the Precambrian and part into a mixed unit of Precambrian metamorphics and Cretaceous intrusive

The stratigraphic nomenclature of the CRBG is based on that presented by Swanson and others (1979b). The group is divided into four formations: from base upward, these are the Imnaha, Grande Ronde, Wanapum, and Saddle Mountains. The Potlatch quadrangle contains exposures of both the Priest Rapids Member of the Wanapum Formation and the Onaway Member of the Saddle Mountains Formation. The uppermost Grande Ronde Formation is interpreted to occur beneath the Priest Rapids in the center of the basin, west of Potlatch. The Priest Rapids Member is separated from the Grande Ronde in the subsurface by clastic sediments that belong to the Vantage Member of the Latah Formation.

Although a bedrock map, Holocene sediments associated with major drainages were included on the map. The distribution of these sediments was useful in interpreting subsurface bedrock

Onaway flows. The creek follows the contact of the Onaway and Priest Rapids, has an unusually COLUMBIA RIVER BASALT GROUP: SADDLE MOUNTAINS FORMATION

distinctive brown weathering rind and in a few localities is weathered to a gray or purple-gray that makes it difficult to recognize as basalt. Camp (1981) identified and named these flows that he interpreted to be the upper part of the Wanapum in northern Latah County. However, additional Mapping on adjoining quadrangles shows that the Onaway flows were extruded from local vents to the north, south and east of Potlatch and flowed into the Potlatch area in valleys eroded in both pre-basalt units and the Priest Rapids Member. Some exposures are 500 feet in elevation above located just west of Potlatch. Eight exposures on the Potlatch quadrangle were sampled and analyzed (Table 2). The variation in chemistry and the overall map pattern suggests that the Onaway consist of three chemical groups indicating multiple flows from possibly separate vents.

Nine outcrops were sampled and analyzed for verification (Table 2). Seven are the Lolo chemical

GRANDE RONDE FORMATION (Miocene)--Consists of flows of fine-grained to very fine-grained aphyric basalt. Though not exposed on the quadrangle the Grande Ronde is interpreted to occur beneath the Priest Rapids Member in the western part of the quadrangle. Regional maps of by

VANTAGE MEMBER (Miocene)--Consists of clay, silt and sand deposits that range from a few feet to over 100 feet in thickness. The sand is angular to subrounded, poorly sorted, and consists primarily of quartz and feldspar with muscovite common in places. This unit is not known to crop out on the Potlatch quadrangle but is encountered in several wells in the Potlatch area. The term "Vantage" (Tv) is used for interbeds bounded by the Wanapum on top and Grande Ronde flows beneath (Siems and others, 1974, and Bush and others, 1998b). Although the name has been used as part of the Ellenburg Formation of western Washington (Swanson and others, 1979b) i

metamorphic effects have made the silica rich "intrusive" rocks difficult to distinguish from the older quartzite units. Field work by Bush and Provant (1998) and Bush and others (1998a) on the Robinson Lake and Viola quadrangles suggests a Precambrian age for these rocks on the

the northern edges of Latah and Whitman counties, placed the rocks along the northeaster border of the Potlatch quadrangle in the Libby Formations of the Belt Supergroup.

structural trends are radically different.

the Wallace is only speculation. Very similar rocks were noted along the western edge of the adjoining Palouse quadrangle (Plate 2).

	Cross-section along the North-South (A-B) line
\mathbf{A}	

CONTOUR INTERVAL 80 FEET

To convert numbers to fast modifyly by 3.5000

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS

POR SALE BY U.S. GEOLOGICAL SURVEY

DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092

Elevation above M. S. L. No data available **Cross-Section Scale**

W-1 W-2		Elevation	Elévation	Thickness	Elevation	Elevation	Thickness	Elevation	Elevation	Thickness	Elevation Top of Tgn2	Elevation Bottom of Tgnz	Thickness of Tgn2	Elev. Top of Precambrian
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W-21	2520				2479	*2340	+139							<u> </u>
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W-38	2525		<u> </u>		2512	*2360	+152		<u> </u>			ļ		
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+ Well completed above base of this unit

			Tab	le 2.	Maio	r and	l trac	e elei	ment	analys	is for	Cal	ոտե	vía D	ivor	Pas	alta	Dat	lata	l. Ta	- l				1			
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				Major El	ements	(normali	zed weig	tht %)										Trace	- Elem	ients (p	nm)							
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ocation	SiO ₂	Al ₂ O ₃	TiO2	FeO*	MnO	CaO	MgO	K ₂ O	Na ₂ O	P2O5	Ni	Cr	Sc	V	Ba	Rb	Sr	Zr	Y	Nb	Ga	Cu	Zn	Pb	La	Ce	Th	Type
C-1	51.46	14.78	3.54	11.19	0.19	10.11	3.82	1.21	2.88	0.83	35	106	38	423	626	20	210	100	40			••						
C-2	53.03	15.56	3.71	8.44	0.173	10.44	3.45	1.25	3.07	0.88	43	115	42	439	1029	30 30	318	192	49	11.1	23	39	156	4	9	78	5	Rosail
C-3	49.89	13.48	3,33	14.10	0.22	9.21	5.28	1.09	2.72	0.77	30	101	36	381			340	202	49	18.5	27	43	161	5	25	60	3	Rosai
C-4	49,75	13.49	3.20	14.09	0.26	9.22	5.39	1.14	2.69	0.77	31	101	34	374	569 563	28	287	179	45	16.8	21	33	136	3	27	47	7	Lolo
C-5	49.96	13.68	3.15	13.68	0.23	9.47	5.24	1.22	2.61	0.75	34	103	30	380		25	281	176	45	14.4	22	41	138	5	12	73	3	Lolo
C-6	50.38	13.75	3.30	12.94	0.233	9.39	5.32	1.19	2.72	0.78	34	102	37		536	24	289	173	44	15.8	23	37	143	5	27	57	7	Lolo
C-7	50.19	13.79	3.29	13.25	0.246	9.49	5.16	1.08	2.71	0.78	36	102	33	393 404	575 578	26	285	179	45	16.8	24	32	145	6	32	66	5	Lolo
C-8	50.98	13.66	3.18	12,96	0.233	8.96	5.46	1.22	2.61	0.74	30	98	32	374		22	285	177	44	15.6	21	54	162	7	31	63	4	Lolo
C-9	50.74	13.87	3.34	12.37	0.218	9.54	5.25	1.15	2.75	0.78	39	104			584	28	276	183	44	15.4	23	34	138	6	16	58	4	Lolo
C-10	49.82	15.94	2.92	12.63	0.21	7.10	3.74	2.21	4.10	1.33			32	392	568	26	292	179	44	15.9	23	33	153	2	32	74	3	Lolo
C-11	48.89	17.46	3.48	11.53	0.16	7.26	4.35	1.00	4.94	0.92	0	4	16	164	580	33	553	352	41	627	27	7	157	5	41	110	4	Onawa
C-12	47.65	16.47	3.84	13.64	0.18	7.95	5,55	1.67	3.38	0.52	10	9	18	171	547	14	961	371	33	65,5	22	18	108	1	48	101	5	Onawa
C-13	49.56	15.93	2.93	12.99	0.21	6.76	4.10	2.23	3.95	1.34	8	23	18	266	407	25	580	275	29	50.5	25	17	119	ŀ	19	83	4	Onawa
C-14	48.34	16.88	3.84	11,27	0.176	8.19	5.61	1.73	3.31	0.65	0 13	2	17	164	592	33	536	350	41	62.2	28	4	156	2	42	133	5	Onaw
2-15	49.44	17.58	3.44	10.69	0.164	7.11	4.51	1.43	4.74	0.03		26 9	19	268	415	22	658	275	27	483	27	12	119	4	41	70	5	Onawa
C-16	47.91	16.73	3.90	11.79	0.180	7.88	5.90	1.67	3.37	0.68	12	-	15	163	536	R	929	374	32	672	21	11	104	2	46	116	7	Опаж
C-17	47.54	16.48	3.84	12.57	0.189	7.83	5.81	1.65			8	23	22	270	431	23	582	282	28	506	24	17	122	ì	29	92	4	Onawa
	,,,,,,	10.70	3.07	14,57	0.109	1.03	3.01	1.03	3.44	0.65	9	23	24	267	409	22	573	280	28	50.7	27	12	118	4	25	70	4	Onawa