



## ***The Music of the Hoh River Valley***

This is a set of pieces evocative of a journey down the Hoh River drainage, from near the peak of Mt. Olympus in the Olympic National Forest of Western Washington to the Pacific ocean. The river descends 56 miles through glaciers, rocks and then a temperate rain forest. The Hoh River Valley is very wet; it is perhaps the wettest spot in the 48 contiguous states. The glaciers of Mt. Olympus receive about 100 feet of snow a year, and the lower forests of the valley get 240 inches of rain every year.

The pieces were all generated on my computer using Csound as a sampler based synthesizer. The samples are from the McGill University Master Samples CD ROM and some environmental sounds. Many were written in February 2009 as part of the RPM Challenge, which is a call for musicians to get off their couches and record the CD of 10 songs or 35 minutes in a month. This is the second year I have taken the challenge and look forward to next year's as well. The last half of the pieces were realized during 2009 and burned to CD in January 2010.

---

### **1. Approaching the Bergschrund at Night**

The winds tend to howl at this elevation, especially when the storms blow in from the Pacific. Warm wet clouds this evening had a eerie sound as they blew up the glacier from the west. In this case, a descending utonality from 3:2 to 6:5 to 1:1 to 12:7 to 4:3 to 12:11 to 1:1.



Near the top of the mountain, it is important to avoid the crevasse caused by the separation of the glacier from the summit. Often hundreds of feet deep, the Bergschrund can be a formidable obstacle in the wind at night.

---

## 2. Walking Down Blue Glacier

We spent all day Sunday running new takes, but something seemed to get in the way with each one. Finally we were able to get a good run through on the 17th try Monday morning. This one includes clarinet, oboe, tuba, marimba, vibes, finger piano, harp, and cello, plus the opening notch filtered wind tunnel sound recorded at the NASA Ames Research Center. As always, fake but accurate is my motto.



## 3. At the Terminus of the Blue

I was able to get the crew to come in early for one more take. We went out to the headwaters of Glacier Creek, where it moves down slope past a forest of high pines. Omar couldn't lug his tuba up this high, and the vibes player said no, but the clarinet, oboe, marimba, finger piano, and harp were included. Celebrate the otonality with triademonium to the 11 limit.

Blue Glacier starts near the top of Mount Olympus, and terminates into Glacier Creek, which eventually flows into the Hoh River.



#### **4. The Rocks of Glacier Creek**

The water moves quickly as it descends from the higher elevations. It tends to form eddies where the rocks block the flow. The water swirls to fill the gaps. Later, the rocks fall away and the water flows unimpeded down the valley. Soon, the rocks pile up and slow the water again.

The piece uses repetition with shifting combinations to emulate the movement of water around rocks. It's scored for environmental sounds and a small ensemble of skilled microtonalists. The environmental sounds are recordings of a gentle waterfall and some birds typically found at the confluence of Glacier Creek and the Hoh River or thereabouts. The birds are the Hermit Thrush, the Black Throated Blue Warbler, the Stellar's Jay, the Hairy Woodpecker, the Pileated Woodpecker, and the Warbling Vireo.

The small ensemble of skilled microtonalists includes clarinet, oboe, vibraphone, marimba, finger piano, cello, and harp. They are asked to accurately play the 53 TET scale, and also carefully slide up a set number of steps, for example, by 8 or 10 steps (approximating the ratios of 11:10 or 8:7 respectively). These guys are amazing in their flexibility and accuracy. I ask them to pick the chord inversion they want, and then slide up or down by a predetermined amount. My vibraphone player has perfected the art of bending his aluminum bars just the right amount to descend by a 6:7 (12 steps in 53-TET).

As always, this music is fake but accurate. Here is some of the coding for the sliding chords. The following is put through my Csound preprocessor to generate the necessary Csound code.

```
.slid-min3-u-a135 t+0&gls11:10. t+14&gls10:9. t+17&gls8:7.
.slid-min3-u-a351 o-1t+14&gls10:9. t+17&gls8:7. t+22&gls11:10.
.slid-min3-u-a513 o-1t+31&gls8:7. t+22&gls11:10. t+14&gls10:9.
.slid-min3-d-a531 o+1t+31&gls8:9. t-17&gls10:11. t-14&gls6:7.
.slid-min3-d-a153 o+1t+0&gls6:7. t-22&gls8:9. t-17&gls10:11.
.slid-min3-d-a315 t+14&gls10:11. t-14&gls6:7. t-22&gls8:9.
.slid-min3-u-b247 t+7&gls11:10. t+15&gls9:8. t+19&gls7:6.
.slid-min3-u-b472 o-1t+22&gls9:8. t+19&gls7:6. t+19&gls11:10.
.slid-min3-u-b724 o-1t+41&gls7:6. t+19&gls11:10. t+15&gls9:8.
.slid-min3-d-b274 o+1t+7&gls10:11. t-19&gls7:8. t-19&gls9:10.
```



```
.slid-min3-d-b427 o+1t+22&gls9:10. t-15&gls10:11. t-19&gls7:8.
.slid-min3-d-b742 t+41&gls7:8. t-19&gls9:10. t-15&gls10:11.
```

To call the chord, I just have to write code for each instrument, like this:

```
.mari-16-min-1f &mari.&key.e16w0d0h17&slid-min3-d-a*.d16
.mari-16-min-1g &mari.&key.e16w0d0h17&slid-min3-d-b*.d16
```

Then I call it when I want it to play like this:

```
&mari-16-min-1*.
```

The asterisk is a "don't care" character. This way, I can create several different note strings and let the computer pick the one it wants him to play at any given moment. Notice that the -a chords are the utonality triad to the 5 limit, and the -b are the higher overtones to the 11 limit. The chord slides from one to the other.

The &gls11:10. variables invoke a Csound function table that slides a note up or down over its duration by a very specific amount and timing. I basically multiply a note by a table of 256 values from 1 to a number larger or smaller than 1. Here is the relevant Csound code for a function table that slides a note to which it is applied by an 8:7. 8 divided by 7 is 1.14285714.

```
;## step start at 1, stay there for 48 of the 256 steps
; move to 1.14285714 over 128 steps
; stay there for 80 of the 256 steps.
f324 0 256 -7 1 48 1 128 1.14285714 80 1.14285714 ; 8:7 g23 up 10
```

## 5. Elk Lake Dancing



Elk Lake is a small alpine lake above Glacier Creek, before it empties into the Hoh River, with a nice small campground.

This is the final piece I was able to finish for the RPM Challenge. It is written for the same instruments as the others: clarinet, oboe, cello, finger piano, harp, marimba, and vibraphone.

I would have liked to include some Elk calls, but I ran out of time. The harmony is based on the otonality to the 15 limit, modulating down a scale derived from the utonality series. It's the same set of changes as my 2002 piece Mirror Walk.

Bb	16:9
A---	8:5
G---	16:11
F	4:3
D+	8:7
C	1:1
Bb	16:9

This is a descending scale, but the voicing from one chord to the next are done so that it sounds like it's going up, when it actually goes down. The notes are the bottom row of the tonality diamond to the 11 limit.

The rhythm is based on dividing 30 beats into one of two general ways: either 5 6-beat quarter notes or 7 4-beat quarter notes and a 2 beat eighth note, with the latter quarter notes slower than the former.  $5 * 6 = 30$  and  $7 * 4 + 2 = 30$ . It's kind of like a 3 against 4, except the 3 has a 5:4 feel to it, and the 4 has a lopsided samba feel.

## 6 - Slow Dance

This piece is made up of two chords, each of which is made up of the six notes of the otonality drifting up or down to other six notes. In this case, I start with a chord of the overtone series 4:5:6:7:9:11 and slide it up and down simultaneously to the same notes. 4 goes to 9 or 7, 7 goes to 4 or 6. Each note glides to its nearest overtone, up or down. There's a finger piano arpeggio that just moves up and down a 53-TET interval while playing on the 4:5:6:7:9:11 notes. They start in synch, drift out and back twice in two minutes. The piece is scored for finger piano, tuba, trombone, flute, French horn and realized in Csound.



My composition takes advantage of a great deal of indeterminacy to arrive at the final result. This has the added bonus of making it very easy to create another realization that has a different set of melodies and durations, but the same basic feel. The rest of the CD is made up of second takes of the same process that created the first ones. In fact I usually create at least 8 takes and save the best two for posterity.

## 7 – Rafting the Middle Fork



This piece rapidly changes pace from fast to slow, alternative the finger piano, marmiba, and slide vibraphone parts from sixteenth notes to eighth notes, with several 3 against 4 against 6 against 8 rhythms. The tempo also shifts, very gradually, from one tempo to another, by about 30% up and down. It ends about 60% slower than it started.

The pitch also shifts. It starts in the key of A minor, but drops by one 53-TET step every 5 to seven 7 five-beat measures. The shifts are difficult to perceive. It's as if you suddenly notice that you are not where you thought you were. Over the course of the ten minutes the tonality drops by 22 steps, to a fourth below A, ending on E.

The tonality is the utonality to the 15 limit. In ratios, they are  $24/(16,20,24,14,15,18)$ .

The vibraphone, marimba, and finger pianos play repetitive rhythmic patterns, while the French horn, clarinet, and oboe play a descending melody, answered by a inverse melody later in the piece.

The overall theme is of descending a river, with fast and slow sections, some complex, some serene, but always moving downhill. There is no middle fork of the Hoh River, but if there were, and if you could raft it, this is a good sound track for that activity.



## 8 – Slow Dance #2

This is the second Slow Dance on the CD. #6 is the first. That piece took two tonality triads and slid them in opposite directions, so I thought it would be useful to do the same with two utonality triads. The original took a chord of 8:10:12 and slid it up to 9:11:14, while sliding a 9:11:14 triad down to 8:10:12. This one takes the 12:(12,10,8) up to 12:(11,9,14) and visa versa. There is a point in the middle of the slide when a minor chord can be heard, midway between the two. The utonality triads are much less settled than the tonality ones.

## 9 – Floating the Lower Hoh

This piece was created for a contest on the Csound mailing list. The object was to take a very simple orchestra, strictly limited to sine waves, and create an interesting orchestra. The scales primarily in A minor, with a bridge of C, F, and G major, a typical rock music set of changes. The minor is predominantly the utonality triad 5/(4:5:6), but there are complementary sections that use 10/(7:9:11), higher up the utonality diamond. This is the first piece I've written that did not use orchestral samples.

The lower reaches of the Hoh have dense vegetation on both sides of the river. This section gets upwards of 240 inches of rain a year. Every storm that hits the Northwest passes over this region, dropping moisture by the bucketful. Cool, damp, quiet, and relentlessly moving towards the ocean to start the cycle again.



## 10 – Through Western Bog Laurel

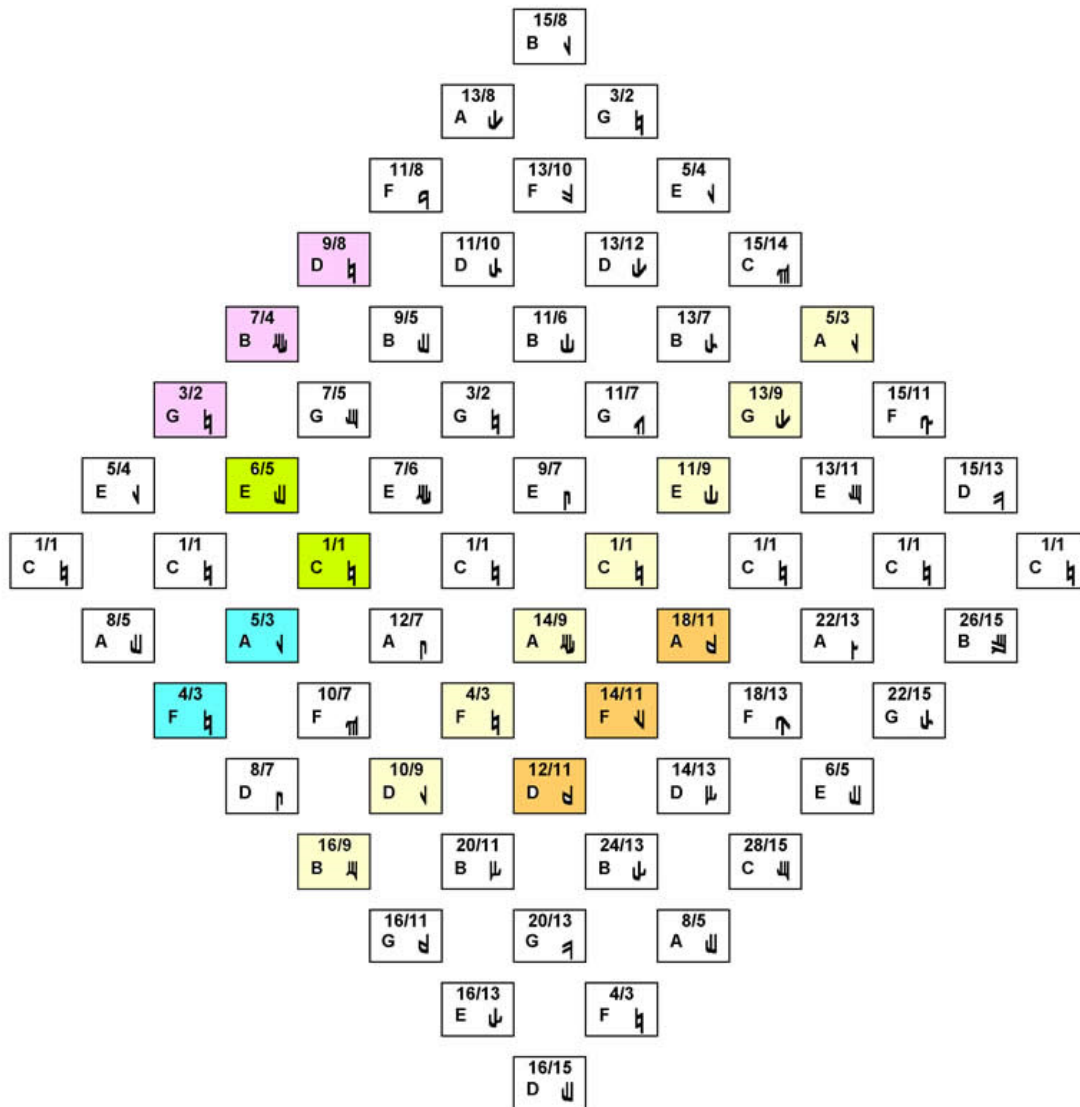
Western Bog Laurel, also known as Swamp Laurel is all over the banks of the lower Hoh river. The fruits and leaves are poisonous, containing andromedotoxin which lowers blood

pressure and causes breathing problems, dizziness, cramps, vomiting and diarrhea.

This piece is named for the weed. It is scored for flutes, marimba, vibe, finger piano, harp, balloon drums, and a percussion board with a contact microphone. The latter instrument includes several rocks, toothbrushes, and pieces of wood, glass, and rocks glued to the surface of a piece of sitka spruce. If you hear something that sounds like a monkey chant, it's probably the percussion board.

The intonation is 72-equal divisions of the octave (72-EDO) approximating the Partch tonality diamond to the 15 limit. There are many glissandi and trills employed. The marimba and vibe are given many opportunities to trill and slide around their pitches. The triad is the basic melodic element, either 4:5:6 or 7:9:11 or their inversions in the major scale, and comparable chords in the sub-minor and minor modes.

15-Limit Tonality Diamond 4:5:6:7:9:11:13:15





The piece starts out in B 16/9, with a scale based on the overtone series. As shown on the chart above, it modulates around the tonality diamond from there. The yellow colored blocks are the B 16/9 major scale. The subminor D 12/11 is in orange, the subminor G 3/2 is in pink, the C 1/1 minor is green, and the F 4/3 major is in blue. I use glissandi to slide from one chord to another.

As with all my works, there is a great deal of indeterminacy. Each instrument has many choices to make, subject to constraints about repeatability and change. Imagine a band improvising from a set of approved riffs.

### **11 – Slow Dance #3**

This is the third of the slow dance pieces on the CD. They are simple palette cleansers for the ears, with limited rhythm. This one takes sub-minor, minor, major, and supermajor third chords and moves from one to another, keeping the third degree of the scale constant while the other notes move.

### **12 – Winding out to the Pacific**

The mouth of the Hoh River enters the Pacific as a gentle stream. The piece is scored for vibraphone, marimba, harp, finger piano, and sine waves. The intonation system is 72 equal divisions of the octave. There are four chords derived from four scales used throughout the piece, and they are played in succession:

- Subminor with a root on the 26th tone in 72 EDO
- Minor on 23
- Major on 19
- Super Major on 16
- Major on 19
- Minor on 23

This sequence is repeated three times. These four scales are derived from the Partch tonality diamond to the 15th limit. The piece uses indeterminacy heavily. Each instrument has a set of choices for what to play. In this version, the choices are random, but weighted towards not picking an alternative if it has already been played before.

This version is the 23th run through the algorithm. The length of time to stay on one of the four chords is variable from one to eight measures, also chosen with a weighted random selection method. The tempo is continuously variable, but it tends to go faster on those chords that are played more measures, and slower when the number of measures is low. The transition from one tempo to another is gradual.

Here's a nice picture of the mouth of the Hoh River as it enters the ocean, about 56 miles from its source.



Prent Rodgers  
Mercer Island, WA  
January 2010  
Contact: [prentrogers@comcast.net](mailto:prentrogers@comcast.net)  
<http://bumpermusic.blogspot.com>