

# Analysis of Chinese Porcelain

Associated with the

*Beeswax Wreck*

Nehalem, Oregon



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ANALYSIS OF THE CHINESE PORCELAIN ASSOCIATED WITH THE  
“BEESWAX WRECK,” NEHALEM, OREGON

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by  
**Jessica Lally**  
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## ABSTRACT

### ANALYSIS OF THE CHINESE PORCELAIN ASSOCIATED WITH THE “BEESWAX WRECK,” NEHALEM, OREGON

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Over the centuries, small sherds of Chinese porcelain have been discovered on Oregon’s northern coast at Manzanita and Netarts, in the vicinity of an offshore shipwreck known as the “Beeswax Wreck,” and are thought to be associated with it. Many of these sherds have been collected by beachcombers, while others have been found within archaeological sites. The focus of this study was to catalogue and analyze a previously undocumented private collection of 1,189 sherds, as well as a small collection located at the Tillamook County Pioneer Museum that was found in the same geographic area and believed to have the same origin. The research conducted in this thesis contributed to the overall understanding of how the collections are related, suggested a visually interpreted date range of manufacture for the porcelain between 1650 and 1700, and provided a mean ceramic date of 1686. These dates are consistent with the *Santo Christo de Burgos*, lost in 1693, which has been suggested to be a likely identity of the Beeswax Wreck.

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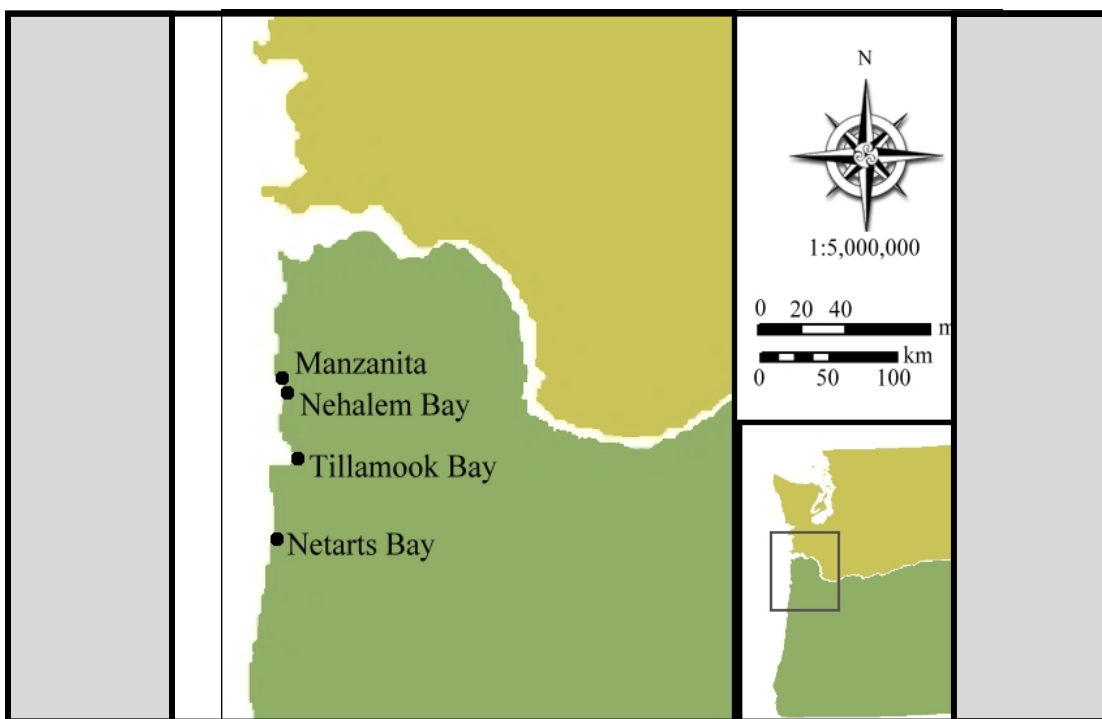
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## CHAPTER I INTRODUCTION

The presence of a shipwreck off Oregon's Nehalem-Manzanita coast has long been known, its cargo washing onto the shores over the passing centuries (Franchere, 1967; Gibbs, 1993; Hult, 1968; Lee & Frost, 1968; Marshall, 1984; Williams, 2006) (see Figure 1). Locally known as the "Beeswax Wreck," its memory has survived the passage of decades, kept alive by the stories of local historians and the occasional finding of artifacts thought to be associated with the wreckage. There have been conflicting opinions as to the origin of the vessel, some believing it to be a Spanish galleon of the Manila Trade (Williams), while others have believed it to be a Japanese vessel, or a Dutch East-Indiaman (Woodward, 1986).



**Figure 1: Location of Manzanita, Nehalem Bay, Netarts Bay, and Tillamook Bay in relation to the state of Oregon.**

Archaeological and historical evidence indicates that the Beeswax Wreck was most likely a Manila galleon (Williams, 2006); however, it remains unknown why a Manila galleon was so far north of the usual trade route. Native American oral histories speak of shipwreck, and in some accounts, survivors (Williams). In addition, numerous historic accounts exist of ship wreckage both offshore and onshore at Nehalem Spit (S. Williams, personal communication, January 23, 2008).

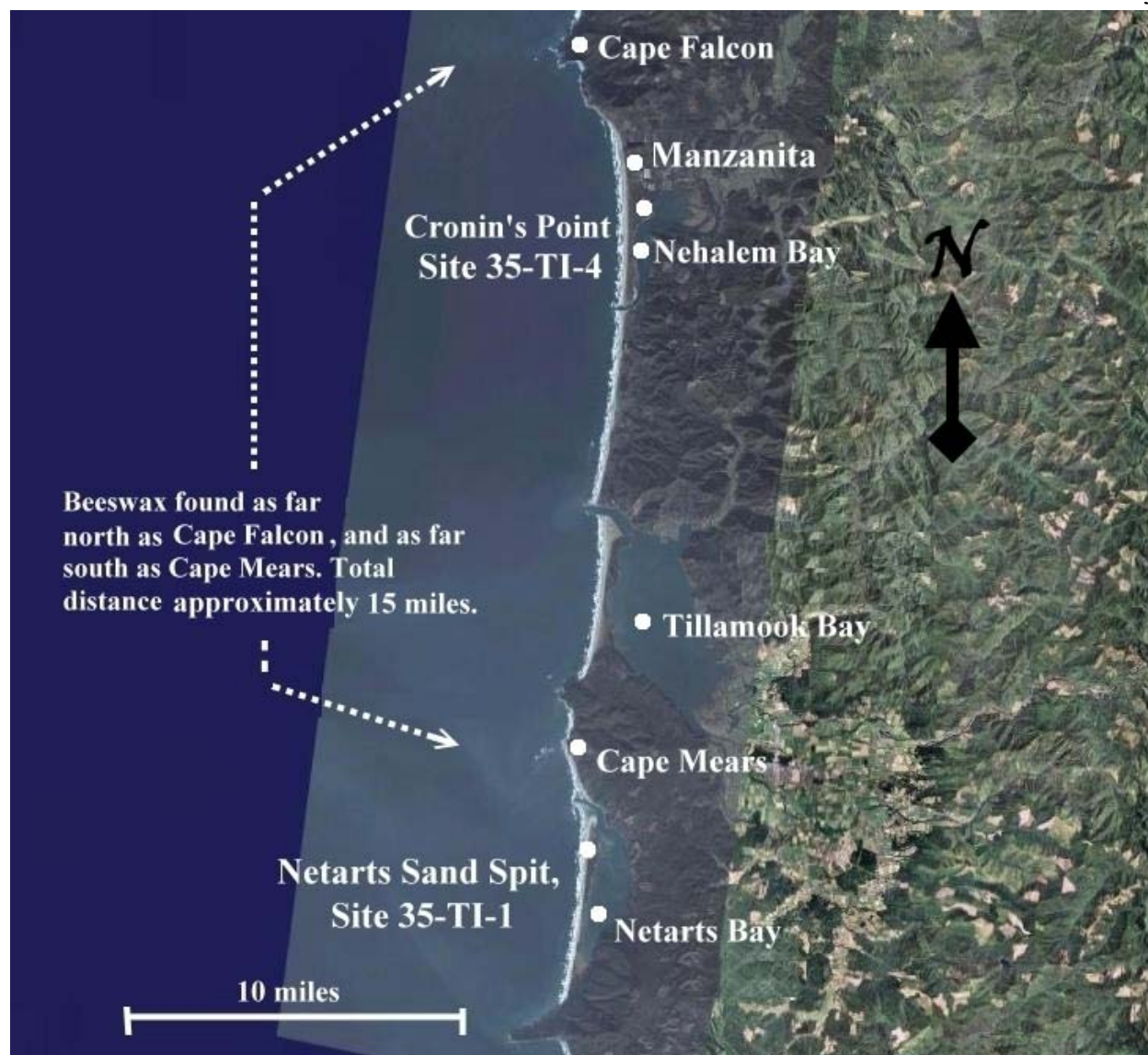
For centuries, large blocks of beeswax (Hult, 1968; Lee & Frost, 1968) and beeswax candles have been discovered in the area (S. Williams, personal communication, January 23, 2008). Beeswax, highly prized by the people of New Spain, was regularly shipped in enormous

quantities from the Philippines aboard the Manila galleons (Cook, 1973). The robust Manila galleons were constructed of teak and other tropical woods in East India and Malaysia, in order to withstand long ocean crossings with such large payloads (Marshall, 1984, p. 175). Teak timbers have been located on the Nehalem Spit as well, in addition to other artifacts such as a silver oleum jar, a pulley, and a rigging block (Williams, 2006). Furthermore, several ship's artifacts, such as metal spikes, were found in precontact archaeological sites near Nehalem Bay and Netarts Bay (Williams), as was Chinese porcelain (Woodward, 1986). The discovery of such artifacts within the same limited geographic area has suggested the presence of a Manila galleon wreck somewhere off the coast of Nehalem (S. Williams, personal communication, January 23, 2008).

Based on current research, the Beeswax Wreck is thought to be one of two Spanish galleons, the *Santo Cristo de Burgos*, which was lost in 1693, or the *San Francisco Xavier*, lost in 1705 (Williams, 2006). The two kinds of artifacts most commonly found associated with the Beeswax Wreck are beeswax and porcelain (Williams). The beeswax seemed to be concentrated on the Nehalem Spit, near the Manzanita area, and its presence and characteristics have been well documented (Beals & Steele, 1981; Scheans & Stenger, 1990; Williams). A total of 6 radiocarbon dates were obtained from material associated with the Beeswax Wreck, including beeswax, a rigging block, a pulley, and teak wood, averaging an uncorrected radiocarbon date of  $310 \pm 10$  RCYBP, and an average calibrated age of AD 1520-1635 (Erlandson, Losey & Peterson, 2001). However, because porcelain designs and styles changed relatively rapidly due to varying market tastes, the porcelain has provided an opportunity to narrow the date range given by the radiocarbon dating and is, therefore, one of the best means to date the shipwreck (McElney, 2006; S. Williams, personal communication, January 23 2008).

To date, the analyses of the porcelain have been limited (Scheans & Stenger, 1990). The porcelain sherds have been determined to be Asian, most likely Chinese (Beals & Steele, 1981; Williams, 2006; Woodward, 1986). They have been found in at least three places: Netarts Bay (Beals & Steele) and Nehalem Bay (Scheans & Stenger; Woodward), as well as Oswald West State Park, north of Nehalem (Williams; Woodward). The outcome of research to date has been conflicting. Beals and Steele analyzed the Netarts Sand Spit collection excavated from Site 35-TI-1 (see Figure 2), and suggested a date of manufacture somewhere between the late Wanli reign (1573-1620) of the Ming dynasty and the Kangxi reign (1662-1722) of the early Qing dynasty.

Woodward analyzed the porcelain found in Nehalem Site 35-TI-4 (Figure 2). His conclusion neither confirmed nor denied the date suggested by Beals and Steele. He proposed a date of manufacture anywhere between the Ming dynasty and the early Qing dynasty, noting that a date later than the Kangxi reign was possible. He also suggested that the wreckage was likely that of a Portuguese vessel, blown off course enroute to Japan. Scheans and Stenger briefly commented on his work, as well as the work of Beals and Steele, only stating that further work was necessary, and suggesting that the two porcelain sites represent porcelain meant for two separate markets. These have been the only analyses conducted on the porcelain prior to this research. No other steps have been taken toward further analysis.

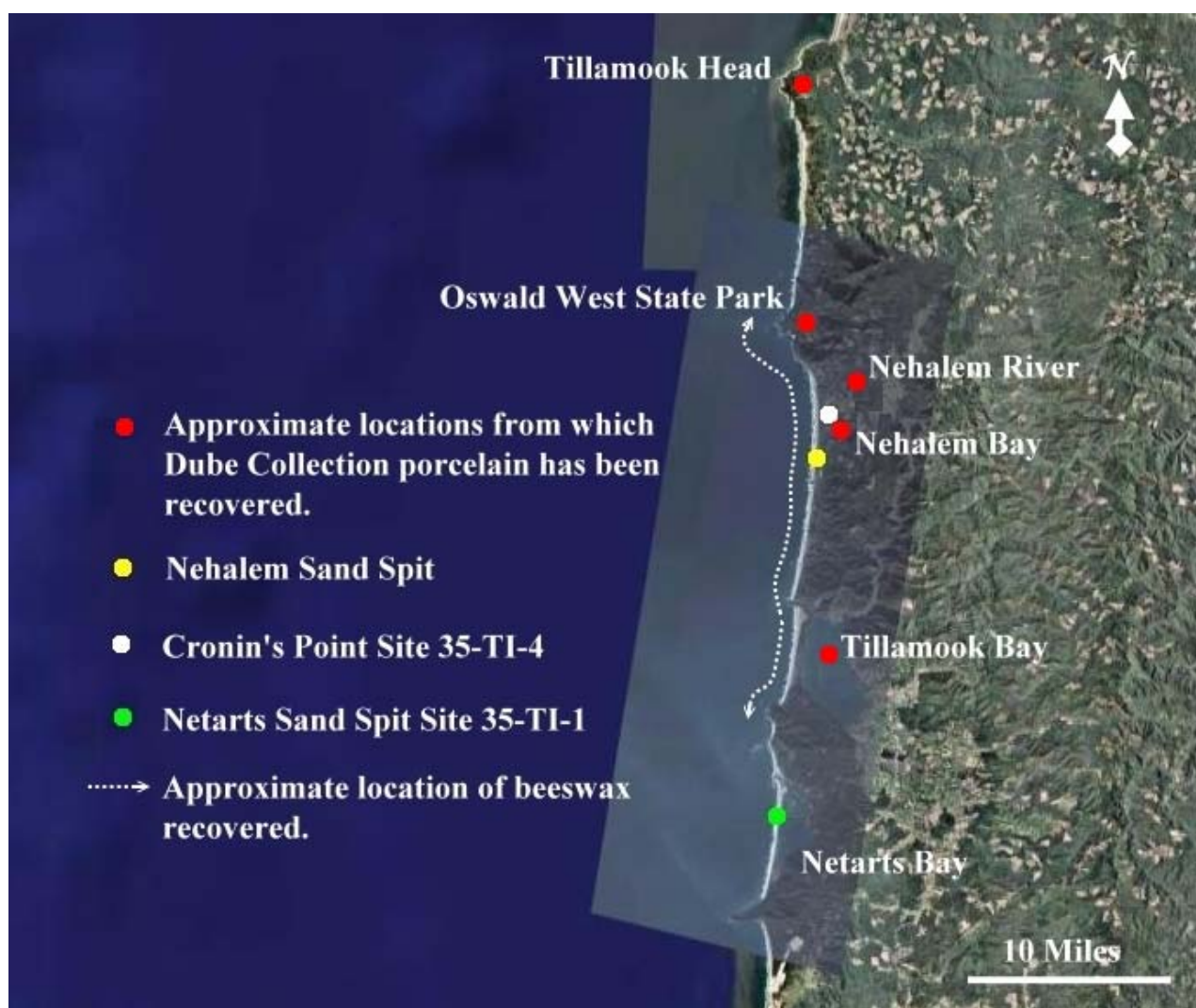


**Figure 2: Distribution of beeswax and archaeological sites associated with Netarts Sand Spit and Nehalem Bay, Oregon. Modified from Google Earth (2007).**

### **PURPOSE AND SIGNIFICANCE**

The primary objectives of this study were to analyze a previously undocumented private collection, here named the Dubé Collection, consisting of 1,189 porcelain sherds found in tidal areas near Manzanita, Oregon, and determine a date of manufacture. The sherd collection was largely made up of underglaze-blue and monochrome-white Chinese porcelain collected from five discrete locales near Manzanita (see Figure 3). In addition to the analysis of the Dubé collection, this study included an analysis of a small collection of porcelain sherds housed at the Tillamook County Pioneer Museum. The porcelain at the Museum was found in the same geographic location as the Dubé collection, and was thought to have the same origin.

Based on both previous and ongoing research, it is assumed that the Dubé Collection and the Tillamook County Pioneer Museum porcelain collection are associated with the Beeswax Wreck, and are anticipated to be consistent with the cargo of a Manila galleon that wrecked near Nehalem Spit between AD 1640 and AD 1700. Analysis of the Dubé collection, in addition to sherds at the Tillamook County Pioneer Museum, were conducted to either confirm or refute this assumption and, in doing so, contributed to the ongoing research into the origin and date of the Beeswax Wreck (S. Williams, personal communication, January 23, 2008). Additionally, this research provided a better understanding of the history of the Oregon Coast. It provided insight into the nationality and destination market of the vessel and its cargo, and served to narrow the date range suggested by previous radiocarbon dating. By providing the porcelain's date of manufacture, the analysis also indicated a possible identity of the Spanish galleon that wrecked off the Nehalem coast.



**Figure 3: Dubé Collection porcelain distribution compared to the location of recovered beeswax and archaeological sites. Modified from Google Earth (2007).**

The research conducted in this thesis also contributed to the scientific understanding of Chinese porcelain found on the Oregon Coast, and provided analysis of a previously undocumented collection. Previous to this study, there have been only a limited number of studies available regarding 17th-century export porcelain from Asia to the New World, and even fewer studies of the porcelain's occurrence in the Pacific Northwest (Beals & Steele, 1981; Scheans & Stenger, 1990). This research helped to provide new information in these areas; provided additional data to help define longstanding ambiguities of previous studies; offered greater detail as to the cargo, nationality, and destination of the Beeswax Wreck; and contributed to local history.



## **CHAPTER II LITERATURE REVIEW**

### **HISTORY OF TRADE AND CHINESE PORCELAIN**

Past research conducted on the porcelain discovered in Nehalem and Netarts has produced possible dates of manufacture ranging from the Ming dynasty (1368-1643) to the Qing dynasty (1644-1912) (Beals & Steele, 1981; Scheans & Stenger, 1990; Woodward, 1986) (see Appendix for list of dynasties and corresponding dates). This time period corresponds with the Spanish Manila Trade, Portuguese Macao Trade, and Dutch trades in the Philippines (Andrews, 1966; Cook, 1973; Woodward). Thus, the literature review in this thesis focused on the time period between 1368 and 1912.

The Ming dynasty exercised strict control of export and trade. This was in contrast to the slightly more relaxed attitude on trade during the Song (960-1279) and the Yuan (1280-1367) dynasties. McElney (2006) stated that restrictions were placed on citizens and commerce when, in 1371, it was decreed that no Chinese citizen could go abroad. Trade on the Silk Road dwindled as did maritime trade. These strict trade restrictions were only relaxed on a few occasions and this relaxation allowed the Portuguese, Spanish, and Japanese to enter into trade with China over the subsequent centuries. In addition to tightly controlled trade, the Ming dynasty also controlled the production of porcelain. The emperors mandated that the Imperial Jingdezhen kiln treat Imperial orders as priority and those pieces that did not fit the strict standards of perfection were destroyed. It was not until the Wanli (1573-1619) reign of the Ming dynasty that small variations were allowed in the porcelain (McElney).

Fear of invasion and distrust of foreigners eventually led to a ban against trade with Portugal in 1521. By decree of Emperor Jiajing (1522-1566), the ban was extended to include all foreigners in 1525 (McElney, 2006). Despite this, large numbers of Chinese communities in both the Philippines and Java served as illegal export centers to countries such as Portugal, Spain and Japan. As porcelain was smuggled out of China and sold for export, officials in these small communities turned a blind eye to the illegal porcelain market, or collected profits from the illegal trade (McElney).

In 1553, the Portuguese took over Macao, turning it into the center of their trading empire (McElney, 2006). From there, they exported Chinese porcelain in great quantities despite the ban on trade with foreigners, and regularly exported goods from Macao to Japan during the period between 1550 and 1639. They remained the supreme power in the export trade, establishing the Portuguese Macao Trade, until pressure from the Dutch who took over Malacca in 1641, caused the eventual Portuguese decline (McElney). It was not until the Ming dynasty reign of Longqing, which began in 1567, that China relaxed its restrictions on trade with foreigners. The Portuguese Macao Trade and the Spanish Manila trade placed an ever increasing demand on China for more porcelain. As a result, the amount of porcelain produced at the kilns of Jingdezhen increased enormously after 1550 (McElney) and major production of porcelain began in the Dehua, Anxi and Yongchun counties (Ho, 1988). Despite the slight relaxation in trade, China continued to strictly control the production of porcelain, passing several decrees that limited the type of decoration that could be used (McElney).

The Dutch were a constant threat to Portugal's position in the Philippine trade, plying similar routes to the Portuguese in enormous *carraks*, heavily armed Dutch trade vessels of 1,000 to 2,000 tons (Andrews, 1966, p. 132). In the 1640s, the Portuguese ports of Malacca and Macao were both lost to the Dutch and, forced out of the primary position; Portugal sought partnership with long-time rival Spain, who had retained control of the port of Manila in the Philippine Islands (McElney, 2006, p. 26). The Spanish were not newcomers to trade with China and the Philippines. Spanish galleons had been crossing the Pacific Ocean on regular trade routes from Manila to Acapulco since 1565. This highly successful trade became known as the Manila Trade and the ships that sailed it, Manila galleons. Their route became the longest continuously navigated route in the world (Schurtz, 1959).

Originally, Spain and Portugal had been in dispute over the control of trade in the Philippines. In order to resolve the disagreement, Pope Alexander VI divided the trade area into two separate realms demarcated by the 370<sup>th</sup> meridian at the Cape Verde Islands, just off the eastern coast of Africa. The Treaty of Tordesillas of 1494 (Mudge, 1986), as it became known, restricted Portugal to the easterly route: around the Cape of Good Hope, past India and on to the Philippines. The Spanish on the other hand, were restricted to the westerly route, around the dangerous Cape Horn passage. Taking over, and setting up the port of Manila as their center of trade (McElney, 2006; Mudge), the Spanish began exporting beeswax, spice, porcelain, and others goods via Pacific trade routes. Non-Catholic nations such as the England and the Holland were left out of the Treaty of Tordesillas; however, despite this, they largely did as they pleased regardless of being in violation of the treaty (Andrews, 1966, Ronald, 2007).

Chinese porcelain was first documented to be exported by Manila galleons in 1573 (McElney, 2006). It was widely thought that these galleons took porcelain from Manila to Acapulco, where they made a brief overland journey, then reloaded aboard other ships, and continued across the Atlantic to Spain. Despite many common misconceptions, most of the porcelain brought to Acapulco by the Manila galleons stayed in New Spain (Mudge, 1986, p. 35). Originally, Manila galleons sailed both eastbound and westbound routes through the Marianas Islands, roughly following the 14<sup>th</sup> parallel (Cook, 1973). This being such a long and dangerous journey, it was not long before an alternative route was sought. It was during the voyage of Miguel Lopez de Legaspi in 1565, that his pilot, Andres de Urdaneta, discovered the eastbound route (Mudge) taking advantage of the northward current off Japan in order to expedite passage back to New Spain (Cook). Although this route was primarily used to take advantage of winds and currents on these more northern routes, another benefit was that the Spanish remained hidden from danger and attack for decades and, as a result, they generally ran with little armament. At times they would reach as far north as the 40<sup>th</sup> or 43<sup>rd</sup> parallel, dropping down the closer they got to the coast of the Americas. The majority of galleons, however, crossed at approximately 32° to 37° latitude (Schurtz, 1959).

## **PORCELAIN**

Porcelain is a type of ware made from porcelain stone (often referred to as *petuntse*), a feldspathic rock consisting of silica, alkali, and alumina, and an aluminum silicate-rich china clay, or *kaolin* (Emerson, Chen, & Gates, 2000). These materials were required to be of a certain

color, generally ranging from gray to white, and became translucent and glasslike when fired at high temperatures (Mudge, 1986), specifically over 1300° Celsius. Porcelain's white and vitrified appearance is highly distinguishable from other materials such as earthenware, as earthenware was made mostly of clay with high iron content that turned reddish when fired (Sinopoli, 1991). While western ceramics studies referred to ceramics in categories such as porcelain, stoneware, and earthenware, the Chinese categorize ceramics by temperature at which the pottery was fired. They consider western categories of porcelain and stoneware as high-fired ware, and the western category of earthenware as a low-fired ware (Mathers, Parker & Copus, 1990).

### **PORCELAIN ATTRIBUTES**

Stylistic and aesthetic changes in porcelain decoration are indicative of particular periods of manufacture and, therefore, it is often possible to determine a relative date of a collection by analyzing the design elements and visual attributes of pieces in the collection (Knappett, 2005). Because of its popularity as a collector's item today, an immense amount of effort has been placed into design analysis of Chinese porcelain, in order to determine the correct age and origin of a piece. These careful observations have been used to determine a date for porcelain found in archaeological contexts as well. The following sections provide information regarding the stylistic and technological attributes and types of Chinese porcelain produced during the period of interest, 1368-1912.

### **THE MING DYNASTY (1368-1644)**

The Ming dynasty began in 1368 and lasted until the Manchu invasion in 1644, which founded the Qing dynasty. Eleven separate reigns constitute the Ming dynasty (see Appendix for a complete list of reigns and corresponding dates) and, in many cases, it is possible to determine the subtle changes in porcelain decoration that correlate to specific reigns within the dynasty. There are, however, overriding characteristics that have been continuous throughout the 276-year span of the Ming dynasty.

Underglaze-blue Chinese porcelain flourished during this time. Seen only in small quantities in previous dynasties, it reached a new popularity, underglaze blue becoming the most popular decoration on porcelain by the end of the Ming dynasty (Mathers et al., 1990). To the Chinese, Ming dynasty porcelain became the "classic" Chinese porcelain and was replicated and copied for centuries after the end of the dynasty (Honey, 1927; Kerr, 1986). Despite this, subtle, unique qualities have made Ming dynasty blue and white distinctive from the porcelain of other reigns—even distinguishable from Ming imitations from other reigns.

Distinctive among underglaze-blue production, Ming underglaze-blue porcelain tends to have a thick bluish-green tinge to the glaze (Mathers et al., 1990), which is often highly textured (Frank, 1969). Common patterns during the Ming dynasty include the wide use of landscapes and trees, which often displayed the use of a crisscrossed motif (Mathers et al.).

Information regarding underglaze-blue pigment, largely made up of cobalt and in some cases manganese, has been contradictory (Beals & Steele, 1981; Frank, 1969; Kerr, 1986). Some



sources have suggested that the color and intensity of the cobalt used can give indications to the time in which the porcelain was created. Ming dynasty porcelain was unique in that the particular cobalt blue used had a great deal of variation from piece to piece (Honey, 1927). The reasons for this have been hotly debated; however, a common reason given is that during the Ming dynasty, some cobalt was imported from the Middle East, while native sources were being used at the same time. Middle-Eastern cobalt, according to some, was of a superior quality than the native cobalt, which contained levels of manganese. Ming dynasty underglaze-blue porcelain often showed a tinge of purple or violet in the underglaze because of the presence of manganese (Honey).

On the other side of this argument are those researchers who believe the two cobalts to be of similar quality, but of very different composition. While the combination of native and foreign cobalt was used throughout the Ming dynasty, there were periods when foreign cobalt was used more heavily (Frank, 1969), and other times when a combination of both were used. These differing periods, often coincided with political problems of the times (Lion-Goldschmidt, 1978).

Regardless of the quality of cobalt used, it is agreed that the origins of the cobalt made a difference in the final tone and character of the blue paint. As noted in Beals and Steele (1981), imported Middle-Eastern cobalt produced thicker lines, thus making linear brush strokes more difficult to control when using the foreign cobalt. In contrast, the native cobalt, which contained a high manganese/cobalt ratio, was easier to control, and, therefore, the brush stroke lines were thinner (Beals & Steele).

While some sources have suggested that cobalt tone indicates the date in which a vessel was made (Frank, 1969) it is important to remember that various firing conditions also affected the final color of the cobalt underglaze (Lion-Goldschmidt, 1978). In fact, firing conditions such as smoke and soot in the kiln, temperature, and the amount of air affected the underglaze color of the vessel to a great degree (Lion-Goldschmidt, p. 21). Lion-Goldschmidt noted that firing conditions and chemical make up of the blue pigment varied to such a degree that cobalt tone should not be considered when determining provenience or the time period from which the vessel came (p. 21). For this reason, as well as the subjective quality and inconclusive—often contradictory—nature of existing literature regarding cobalt tone of Chinese porcelain, a large emphasis was not placed on cobalt tone during the course of this study.

### **KRAAK PORCELAIN**

It was during the Ming dynasty that the production of *kraak* porcelain began. *Kraak* porcelain was produced expressly for the export market and was especially popular with the Dutch. In fact, the word *kraak* came from the term the Dutch used to describe the porcelain and the type of ships the Dutch used for export (Andrews, 1966). It was decorated with non-Imperial designs, such as seascapes, pagodas, ships, and deer under pine trees or birds on rocks that appealed to the export market (McElney, 2006).

The production of *kraak* began soon after the arrival of the Portuguese in Macao in 1557 (Harrison, 1995; Mudge, 1986), and while most sources have agreed on this, the end date of

*kraak* production has been debated (Frank, 1969; McElney, 2006; van der Pijl-Ketel, 1982). Most sources placed the decline around 1640 to 1650 (Harrisson; McElney; Mudge) when the Manchus invaded China, causing the collapse of the Ming dynasty. The invasion greatly impacted the area of Jingdezhen in Jiangxi Province, the central hub of porcelain production, including the production of *kraak* (Mathers et al., 1990). Other sources, such as van der Pijl-Ketel, acknowledged other interpretations that allow for later dates, and in fact, *kraak* style motifs have been observed on later porcelain as well, notably among the *Ca Mau* cargo that dated between 1723 and 1735 (Chiên, 2002). Regardless of the true end of production of Chinese *kraak* porcelain, the Japanese began producing *kraak* porcelain imitations between 1640 and 1650. This porcelain, made by the Japanese, has been distinguishable from Chinese *kraak* by the presence of *spur marks*, small rough knobs of biscuit, or fired, unglazed porcelain, on the bases (McElney).

*Kraak* was made from medium quality porcelain, and it is common to see grit or sand adhering to the footrim. The sand was used to keep the porcelain from adhering during firing. In most cases, in high quality or imperial wares, this sand would have been polished off; however in the case of *kraak* and some provincial wares, which were often mass produced (especially in the case of export), time was not taken to do so (Mathers et al., 1990). Another trait of *kraak* is the presence of *chatter marks*—radiating gouges made when the pieces were formed usually seen on the base or footrim. Usually porcelain from this period displays thick bases and very thin rims (Mathers et al.).

*Kraak* maintains the bluish-tinted glaze that defined the Ming dynasty wares. It also displays what are known as *moth eaten edges*—small areas on the rims that have no glaze. This occurred because the earthiness of the biscuit was incompatible with the glaze (Frank, 1969) and, during cooling; the body and glaze would shrink at different rates, leaving gaps in the glaze at the rims (Mathers et al., 1990).

During the nearly 93 years of its production, *kraak* porcelain endured many stylistic changes. In the early stages of production during the 16<sup>th</sup> century, *kraak* was usually seen in the form of small bowls (20 cm in diameter). Common decorations were Jiajing reign influenced designs such as landscapes with five deer (Frank 1969, Mathers et al., 1990). The deer, regardless of the number depicted were common in the 16<sup>th</sup> century, but were rarely used in the first 3 decades of the 17<sup>th</sup> century. They then came back into vogue near the later part of the Ming dynasty (Mathers et al.).

It was not until the last quarter of the 16<sup>th</sup> century that border patterns were divided in panels on rims, and it was this panel pattern that has been considered characteristic of *kraak* porcelain (Mathers et al., 1990, McElney, 2006). Blue was applied by outlining the motifs with dark blue and then using washes of blue to fill in the outlines. Different intensities of washes could be used to create different intensities of color and shading. During the 16<sup>th</sup> century, *kraak* was painted a variety of shades of blue, most of which seem to have a silvery hue (Mathers et al.).

Beginning in 1595, the Dutch began placing huge orders for *kraak* porcelain. From this period on, motifs on *kraak* porcelain were no longer as varied, and the 17<sup>th</sup>-century *kraak* became synonymous with a decline in quality, stereotypical styles, less shading, more quickly executed exterior motifs on plates (Harrison, 1995), and blue painting that was far less accurate. The shapes of *kraak* became highly varied during this time, including many closed shapes, pear shaped bottles, wine pots, cups, and betel boxes. Starting in the second quarter of the 17<sup>th</sup> century, dishes and bowls no longer displayed molded motifs and cavettos, or concave molding (Mathers et al., 1990). Underglaze-blue decorations departed from the silvery shade used in 16<sup>th</sup>-century *kraak* and took on a much darker shade of blue in the 17<sup>th</sup> century.

Around 1640, a minimum of cobalt-blue shades were used, with potters usually limiting the decorations to two shades—a very light one used in majority, and a dark shade (Mathers et al., 1990, p. 409). This type of decoration is seen in porcelain excavated from the shipwreck *Nuestra Señora de la Concepción* (1638) where pieces were generally painted a bright or light blue with very little shading (Mathers et al.). Mathers et al. stated that this type of decoration should not be attributed to pieces earlier than 1637.

In the 17<sup>th</sup> century, toward the later part of the *kraak* porcelain production period, influences of the Transitional period (1620-1683) (McElney, 2006; van der Pijl-Ketel, 1982) were seen with the inclusion of landscapes (Mathers et al., 1990) and tulip-like flowers (van der Pijl-Ketel), which may actually have been a carnation bud (Mathers et al.). Other favored decorations were kylins—mythical animals with hooves and lion heads—mandarin ducks, deer, rabbits, insects, and dragons. There were usually no marks displayed on the bottom of the piece, although, occasionally a single plum branch was used in place of a mark (Frank, 1969).

Much like the disagreement regarding when *kraak* ware ceased production, there has often been disagreement regarding what types of porcelain should be considered true *kraak* porcelain (van der Pijl-Ketel, 1982). In order to provide a degree of standardization, Dutch museums created criteria outlining the required characteristics that define *kraak* porcelain. These include criteria such as body, glaze, decoration, footrim features, and potting (van der Pijl-Ketel), a term used to refer to the thickness of porcelain vessels.

### **TRANSITIONAL PERIOD (1620-1683)**

The Transitional period refers to the time of transition between the Ming and Qing dynasties (Mudge, 1986). In fact, it encompasses the last two reigns of the Ming dynasty, the Tianqi (1621-1627) and the Chongzheng (1628-1643), and the first two reigns of the Qing dynasty, the Shunzhi (1644-1661), and a portion of the Kangxi (1662-1722) (Mathers et al., 1990). The Chinese Ming dynasty had disruptive problems with the Manchu throughout the last two reigns of the dynasty. It was not until 1643 that the Manchu succeeded in overthrowing the Ming dynasty. The last Ming emperor committed suicide in 1643 and the Manchu then founded the Qing dynasty (Honey, 1927).

During this period—the period of the invasions with the eventual overthrow of the Ming dynasty, and the founding of the Qing dynasty—the Imperial kilns at Jingdezhen produced lower

quality wares and seem to have had difficulty fulfilling orders for the next several decades (Honey, 1927). In fact, the Imperial kilns suffered so much difficulty and decline in export (Rawski, 2002) that the Imperial kilns at Jingdezhen were thought to be nonoperational for at least the duration of the Tianqi and Chongzheng reigns (Frank, 1969). To keep up with Europe's growing demand for pottery, private kilns began filling orders. Potters, once employed by the Imperial kilns, found new employment in private kilns, lending their skill and mastery to the production of wares for the foreign markets (Mathers et al., 1990). This had an unexpected outcome. The strict control of design and shape that occurred during the Ming dynasty no longer applied. With little government intervention, new innovations arose and private kilns could produce high quality pieces with new shapes and designs (Mudge, 1986).

Transitional period porcelain often shows some of the same qualities of the Ming dynasty wares; however, they display a new freedom and boldness of design, and lack the refinement and quality of the later Kangxi wares (Honey, 1927). Transitional porcelain wares often have well potted bodies with the porcelain lacking impurities. Glazes are rich and sometimes retain the classic Ming dynasty color of a bluish or greenish tinge (Mathers et al., 1990), and often contain small bubbles. At times small areas, referred to as *bare bones*, burned black during firing because the glaze did not completely cover the porcelain. In addition, because the bases often were not covered in glaze, patches of apricot colored discoloration are present (Frank, 1969).

A plethora of new shapes are associated with this period, most of which are decorative in nature, including vases, brush pots, incense burners, and jars, as well as European shapes. The barrel shaped jar was especially popular, and there are very few flat shapes such as plates or platters associated with the Transitional period (Mathers et al., 1990). Most of the pieces manufactured during this time display a brown coating on the rim placed there to protect the edges from chipping. This feature is generally considered indicative of porcelain meant for export, (Honey, 1927); however, brown-rim dressing was not limited to the Transitional period. Recent research has revealed that the use of brown-rim dressing began in the Chongzhen reign and was used on polychromatic porcelain made for the Japanese market (Butler, 2002, p. 23). It was later adopted by the Japanese (Frank, 1969), and did not appear within the Chinese domestic or export market until the 1640-1660s, during the reign of Shunzhi. Eventually it was discontinued in early Kangxi reign, and remained out of fashion until the 18<sup>th</sup> century when it was used again on export wares (Butler et al., p. 23).

New shapes common during the Transition period lent themselves to new forms of decoration. Scenes depicting stories found in popular books at the time became preferred decoration. During the High-Transitional period, roughly (1634-1643), landscapes were often depicted, as were trees with distinct v-shaped crisscross patterns to the leaves (Butler, 2002, p. 21). Figures in motion, naturalistic motifs, birds, mythological animals, plantain leaves, and flower sprays were also common. Border patterns, such as lappets, *ruyi* heads, and flames were often carried over from the Wanli reign (Mathers et al., 1990). A few distinct decorations that were seen only in the High-Transitional period porcelain were small tight scrolls incised in the body beneath the glaze, elaborate tulip-like flowers, and soaring cliffs entangled in clouds (Frank, 1969).

Dramatic and intense blending from white to dark violet was frequent among these wares (Frank, 1969). During this time, the native cobalt blue underglaze took on a distinctly violet hue, and the white had a bit of a milky look—often referred to as *violets in milk* (Frank; Mathers et al., 1990).

The Tianqi reign is the first reign of what is considered the Transitional period. Porcelain that is distinctly Tianqi is of rather low quality in comparison to other reigns, pigment was a violet-gray tone, drawing was imprecise, and chatter marks and accretions of sand are generally present (Frank, 1969). A style known as *ko-sometsuke*, emerged at this time featuring cartoonlike drawings of figures. This was originally designed as an export to Japan and found a large degree of popularity there (Frank).

Little is known regarding underglaze-blue porcelain production of the second reign of the Transitional period—the Chongzhen. Since the Imperial kilns were thought to have been nonoperational at this time, it is thought that porcelain was made by private kilns (Frank, 1969; Mudge, 1986, p. 71). However, most of the finer non-Imperial, Transitional porcelain is thought to belong to this reign as well as the Shunzhi reign (Frank). Recent research reported by Curtis (2002) led to the discovery of many features unique to the Shunzhi reign, including grooved footrims and motifs which focused on scholastic success.

### **THE QING DYNASTY (1644-1912)**

At the same time that the Qing dynasty was founded, Europe increased its demand for export porcelain. This demand was filled for a time by private kilns during what is known as the Transitional period (Mudge, 1986) which encompassed the first two reigns of Qing emperors, Shunzhi and Kangxi. It was not until the Kangxi reign and the appointment of Ts'ang-ying Hsuan as the director of the Imperial factory in 1683 (Frank, 1969) that the Transitional period came to an end and true Kangxi porcelain began to be produced.

During the Qing dynasty, potters at the Imperial kilns at Jingdezhen created a variety of porcelain ranging greatly in type of decoration as well as glaze. This alone has made Qing dynasty wares a challenge to date (Kerr, 1986). To complicate things further, Chinese potters always created reproductions of past styles to some degree. This was particularly true in the Qing dynasty as potters seemed even more preoccupied with the reinterpretation of past “classic” forms (Kerr).

Qing dynasty porcelain displays a pure and bright cobalt blue (Honey, 1927). During this period, methods of producing cobalt became advanced, the best pigments having come from local sources at nearby Zhejiang province. Cobalt from Zhejiang was refined from calcined cobalt ore. Other local sources of ore were Guangdong and Guangxi; however, cobalt from these sources tended to blacken when fired (Kerr, 1986). Like the Ming dynasty, there are many distinct characteristics of Qing dynasty porcelain that allow its manufacture to be traced to a single reign within the dynasty.

The Kangxi was the second reign of the Qing dynasty; however, it was the first post-Transitional reign. The production focus throughout the Kangxi reign was on underglaze-blue porcelain and imitation of past forms was common (Kerr, 1986). Several design innovations were made during this period, among them, the *tiger lily* pattern, or *feathery flower* pattern, as it was sometimes called. This design was popular on commercial quality pieces. In addition, the outlined silhouette filled in with cross hatching, white flowers and branches surrounded by blue wash, the *reverse white on blue* style, and the *t'ao t'ieh*, or the ogre mask, all were created at this time (Frank, 1969). One of the most popular innovations of the Kangxi reign was the *hawthorn jars*. Although they have been called hawthorn jars commonly, the design on the jars actually depict plum blossoms, a Chinese symbol of the New Year. These jars generally depict white plum blossoms and branches against a *cracked-ice* background. The cracked-ice pattern was created by adding graded washes over lightly drawn angular marks (Frank), imitating the appearance of frosted water.

Kangxi-reign porcelain has been generally broken up into three distinct eras: early Kangxi (1662-1683), mid-Kangxi (1683-1710), and late-Kangxi (1710-1722) (Macintosh, 1977); however, there is some disagreement as to the date range of the mid-Kangxi, Kerr (1986) considering its beginning 1674. Early Kangxi-reign porcelain largely resembles other Transitional wares, particularly those of the Shunzhi reign. During the middle, or mid-Kangxi reign, potters continued to use past reign marks on porcelain; however, the practice of imitating past styles had tapered off to some degree (Kerr). Distinctive, popular patterns that emerged at this time include the hawthorn pattern, which was really plum blossoms, and cracked ice, mentioned above. It was common to see branches accentuated with dots and rocks filled in with blue washes during this time period (Kerr).

Large quantities of mid-Kangxi-reign porcelain were created for export markets to the Middle East and Europe. Export ware from the Kangxi reign was of extremely high quality (Honey, 1927), often indistinguishable from nonexport wares. Export wares tended to be very thinly potted as clay was used economically. Turning marks made during the process of thinning the porcelain are often been visible (Kerr, 1986). In contrast to dishes from the early Kangxi reign which had a heavy foot, dishes in the mid-Kangxi reign had a small incurving foot. It was common to see formal borders used to fill in space and frame design and radiating panel designs. Chrysanthemum-flower designs or aster patterns, as they are sometimes known, were extremely popular for export to the Middle East and Europe (Kerr).

The late-Kangxi reign is known for its general perfection of earlier forms (Honey, 1927). Generally speaking, the foot on Kangxi wares changed during this period. Instead of the incurved foot used in the mid-Kangxi reign, the foot in the late-Kangxi reign was broad and flat, often pared down on the outside edge to give a “stopped” effect. Painting during this period was often done with a spiky outline filled in with washes of blue. Export wares displayed busy designs and the panel pattern remained popular. This contrasted with Imperial wares of the same period that were conservative and made in imitation of the early Ming dynasty, utilizing textured glaze and patchy blue painting (Kerr, 1986).

## LATE-QING DYNASTY

What is known as *hollow line* is a feature exclusive to underglaze-blue porcelain, is common on pieces produced during the late-Qing dynasty, and is generally indicative of that era (Chou, 1978). It is unknown exactly what caused the hollow line effect; however it is believed that it may be due to a lack of a binding agent in the pigment and an overall change in the quality of the production process. Hollow line produced a similar look to that of outline and wash technique, but, on close inspection it is clear that line has been created by a single brush, with the outsides of the line appearing darker and the insides of the line appearing very light, thus giving the line a hollow affect. Because of its resemblance to outline and wash, hollow line at times is difficult to identify. Despite this, a unique feature created during the painting process is indicative of hollow line—the accumulation of blue pigment at the end of a brushstroke. These accumulations have been seen in the form of a dot or a ring at the end of the line (Chou). Hollow line is seen in some quantity on late-Qing dynasty porcelain; however, it is most commonly attributed to the Guangxu reign (1875-1908) (Beals & Steele, 1981), especially when hollow line appears in reign marks (Chou).

## MARKS

Marks on Chinese porcelain appear in many forms. Usually seen on the bottom of pieces, or at times, on the lip, they were either written in regular script (*kiashu*) or sealscript (*zhuanshu*) (Kerr, 1986). They took on a variety of forms such as dates, reigns, hallmarks, potters marks, symbolic emblems, merchant's marks, dedications, or commendations (Honey, 1927). Reign marks from earlier periods were often used and, therefore, cannot be translated directly for a reliable date. However, they should not be discounted. Reign marks, as well as other marks, should be taken into account along with the context of the rest of the porcelain piece (Mudge, 1986).

The practice of using earlier reign marks was not an attempt at creating a “fake” (Kerr, 1986). Instead, this practice was generally carried out for two reasons. First, to the Chinese, the use of previous reign marks was a sign of respect and a way of showing admiration and veneration of the past. The Kangxi reign is an excellent example of this as true Kangxi marks, on Kangxi-reign porcelain, are rare and generally are only seen on pieces made during the later part of the reign. However, it is common to see Kangxi reign potters using Ming dynasty marks, the Chenghua mark being the most commonly used (Mudge, 1986).

Secondly, Chinese exporters recognized that European markets valued the marks and saw them as a seal of authenticity and value. However, during some periods the use of the mark of the reigning Emperor was prohibited on porcelain not meant for Imperial use. Exporters found a way around this by using past reign marks, symbols, and hallmarks, as well as many others. The Kangxi reign, again, is an excellent example of this practice. During this period, the official reign mark was prohibited by decree in 1677 and was not lifted until the middle of the reign (Kerr, 1986). While unable to use the official reign mark, potters began using the reign marks of earlier periods (Mudge, 1986). In addition, symbols such as the *Artemisia* leaf, twin fishes, spring fungus, Eight Precious Objects, and the Eight Buddhist Objects were used in frequency.

Hallmarks also appeared in quantity at this time—some 50 are known and documented as being used during the Kangxi reign (Kerr).

Although most export porcelain bore marks, it has not been a rarity to find pieces that have no marks (Frank, 1969). At various times during the history of porcelain production, reign marks were omitted from export wares. This could have been for a number of reasons, many of which remain unknown. However, the greatest decline in the presence of marks on export wares occurred at a time when Europe no longer requested pieces of Asian influence. Instead, European markets began to request special order porcelain in both European design and function, and also European decoration. After the Yongzheng (1723-1735) reign, it is rare to find reign marks on exports. It is assumed that Europeans, requesting pieces of more European influence, no longer saw value in the marks (Mudge, 1986).

A key to determining the authenticity of a reign mark is to look at the calligraphy of the mark itself. This provides valuable clues as to whether a mark should be considered a genuine representation from a particular reign, or one meant to exemplify a past reign. Mentioned earlier, the Kangxi reign commonly used the Chenghua reign (1465-1487) mark; however, true Chenghua marks are distinguishable from those of the Kangxi reign. True Chenghua marks were bold and chunky; the characters filled a double-blue circle and seem almost cramped within it (Frank, 1969). However, in contrast, Chenghua-marked porcelain from the Kangxi period is not heavy or bold (Beals & Steele, 1981). Rather, the characters are spread out within a double, blue circle and are generally arranged in two vertical columns (Frank).

In addition, it is possible at times to distinguish authentic reign marks from those that are not by studying the formation of the characters themselves (Frank, 1969). Over time, characters themselves changed, either growing more complex or more simple. For example, dating from the beginning of the 16<sup>th</sup> century, it is common to see that on the stroke called the *nien*, a vertical stroke was omitted and was instead replaced by a horizontal one. This practice continued for the duration of porcelain production (Beals & Steele, 1981).

### ***EXPORT PORCELAIN***

Pere Francois Xavier d'Entrecolles, a Jesuit missionary, traveled to China in 1698 and studied porcelain production (Honey, 1927). In his writings of 1712, he noted that “little else was taken to Europe,” and that export pieces were of such high quality that it would be difficult to distinguish them from finer pieces meant for the Asian markets (Honey, p. 65). He noted that often European merchants provided kilns with European examples from which to copy either shape or decoration (Honey).

There are, however, some features that distinguish export porcelain, or porcelain made for European tastes, from those made for Chinese use. First, large, flat plates with wide rims were made solely for the export markets. Large, wide rims were designed for condiment use in the formal dining atmosphere of European culture and were never seen in wares made for Chinese use (Honey, 1927). Second, it is common to see sand or gravel adhering to the footrim of export and provincial porcelain because mass production could not accommodate time to



polish off the kiln sand (Mathers et al., 1990). Lastly, porcelain that has been eroded by sand and sea often loses its glaze and, in these cases, it is sometimes possible to see textile imprints on the ceramic body. Textile was used when preparing large pieces, especially dishes, as laying the slab of clay over textile made it easier to transfer to and from the mold (Mathers et al.).

There is a great deal of contradictory information regarding what characteristics are the most indicative of export ware (Frank, 1969; Honey, 1927). It appears that the most reliable resources have often been catalogues of shipwreck cargoes such as the 1613 wreck of the *Witte Leeuw* (van der Pijl-Ketel, 1982), the 1600 wreck of the *San Diego* (Desroches, Casal & Goddio, 1996), the 1643 wreck of the *Hatcher Junk* (Sheaf & Kilburn, 1988), the 1690 wreck of the *Vung Tau* (Jorg & Flecker, 2001) as well as others.

### **JAPANESE PORCELAIN**

The Japanese had been importing Chinese porcelain for some time. It was not until 1605 that they began producing their own, which was largely blue underglaze with red overglaze and gilt. This porcelain became known as *Imari* and was transported in Chinese junks from Japan to Manila (Mudge, 1986). During periods in which China could not produce necessary quantities of export porcelain, particularly between 1662 and 1682 (Rawski, 2002, p. 34), Japanese potters met the demand for export porcelain during the decline and replaced Chinese porcelain on the export markets (Harrisson, 1995).

Japanese underglaze-blue porcelain is generally an imitation of Chinese export wares such as Swatow and others. Since they would often bring their wares to the Philippines or to Chinese ports, the Japanese began receiving orders from European and particularly the Dutch markets, and therefore, styles and decorations often reflected European tastes (Frank, 1969). The blue used was a blackish, gray-lavender; the white porcelain body is a grayish tone. In the 17<sup>th</sup> century, Japanese potters began mimicking the brown rims they saw on Chinese export wares. Spur marks on the bases of Japanese porcelain make it easily distinguishable from Chinese porcelain (Frank).

### **THE “BEESWAX WRECK”**

Archaeological and historical evidence indicates that the Beeswax Wreck was most likely a Spanish Manila galleon (Gibbs, 1993; Williams, 2006); however, others have suggested that it may be a Japanese, Chinese, or Portuguese vessel (Williams; Woodward, 1986). Named for the large blocks of beeswax found in the Nehalem area, the shipwreck is well documented in local history, although accounts vary. Native American oral histories speak of a shipwreck, and in some accounts, survivors (Williams). Early explorers contacting the Clatsop Tribe reported the presence of Chinese coins as well as fair-haired and fair-skinned people living amongst the population (Hult, 1968). Many of the fair skinned people, explorers noted, indicated that they were the descendents of shipwreck survivors (Hult). One in particular was noted as being the descendent of a Spaniard (Franchere, 1967; Williams).

Historic accounts note the presence of ship wreckage both offshore and onshore at Nehalem Spit (S. Williams, personal communication, January 23, 2008). During the 1800s and

1900s, many local residents collected beeswax and teak wood from the shore and dunes near Nehalem Bay. Additionally, interviews conducted during 1950-1960 recorded accounts of local residents who remembered seeing the exposed wreckage (Williams, 2006). Other artifacts have been found nearby as well including a rigging block, a pulley, and a silver oleum jar. The jar, which was identified as a specific vessel-style used in Catholic ceremonies during the 17<sup>th</sup> century, is now housed at the Tillamook County Pioneer Museum (Williams). Additionally, metal spikes were found in precontact archaeological Sites 35-TI-4 at Nehalem Bay (Cronin's Point) and 35-TI-1 at Netarts Bay (Williams). Chinese porcelain was also recovered from Sites 35-TI-1 and 35-TI-4, as well as the Wilson River Site on Tillamook Bay (these archaeological sites will be discussed in detail in the following sections).

A total of six radiocarbon dates were obtained from material associated with the Beeswax Wreck (see Table 1), including beeswax, a rigging block, a pulley, and teak wood, which was reworked into a cane in the 1800s for tourists, averaging an uncorrected radiocarbon date of  $310 \pm 10$  RCYBP (Erlandson et al., 2001). Calibrations of the radiocarbon dates were conducted with CALIB 4.3 at 1 sigma, and an average of the 4

**Table 1: Radiocarbon Dates Associated With the “Beeswax Wreck”**

| Dated material                    | Uncorrected C14 date (RCYBP) | Lab number | Calibrated calendar age |
|-----------------------------------|------------------------------|------------|-------------------------|
| Beeswax <sup>a</sup>              | $390 \pm 80$                 | Beta-27530 | 1441-1630 <sup>b</sup>  |
| Beeswax <sup>a</sup>              | $280 \pm 110$                | —          | 1475-1945 <sup>c</sup>  |
| Beeswax                           | $300 \pm 30$                 | LJ-5646    | 1520-1645 <sup>c</sup>  |
| Pulley                            | $310 \pm 20$                 | —          | 1520-1640 <sup>c</sup>  |
| Rigging block                     | $316 \pm 13$                 | QL-4918    | 1522-1637 <sup>c</sup>  |
| Teak cane                         | $312 \pm 21$                 | —          | 1520-1640 <sup>c</sup>  |
| Average of 4 high precision dates | $310 \pm 10$                 |            | 1520-1635 <sup>c</sup>  |

*Note.* RCYBP = Radio carbon years before present. Dashes indicate data were not recorded in original study. Data from Erlandson et al. (2001) and Williams (2006).

<sup>a</sup>Data was not included in the computation of the average. <sup>b</sup>Radiocarbon date calibration completed by Dr. P. Lubinski (personal communication, October 22, 2008) using CALIB 5.0 at 1 sigma. <sup>c</sup>Calibrations were computed using CALIB 4.3 at 1 sigma.

most high-precision dates were calculated, resulting in an average calendar age of AD 1520-1635 (Erlandson et al.). Erlandson et al. further refined the average calibrated date range to 1620-1650 based on the following criteria: the suggested dates of manufacture of ceramics found at Nehalem Bay (35-TI-4) and Netarts Bay (35-TI-1) precontact sites, which were believed to conform to this date range, and there was a lack of European artifacts from those sites prior to 1600. For the purposes of this study, the radiocarbon dates will be discussed in terms of Erlandson et al.'s refined date range and will be considered to more closely correspond to their suggested date range of 1620-1650.

## **PAST RESEARCH CONDUCTED ON THE NETARTS AND NEHALEM CHINESE PORCELAIN**

In 1981, Beals and Steele analyzed 127 fragments of porcelain found at Site 35-TI-1, a large village and shell midden site consisting of at least 7 house pits, on the Netarts Sand Spit in Tillamook County, Oregon. The site, located in a grassy clearing, extending into the tree line, and measuring approximately 300 m × 100 m, was originally excavated in the 1950s and since that time it has been greatly vandalized. The records for this site from the Oregon Office of Historic Preservation are of poor quality and little information regarding the site could be obtained from the records. It is apparent from the records, however, that stone, shell, and fire-cracked rock were recovered from the site, in addition to porcelain sherds.

Beals and Steele (1981) performed a macroscopic examination of the sherds and grouped them into seven distinct groups, assigning them group numbers I through VII. Group I consisted of sherds that bore the Chenghua reign mark within an underglaze-blue double circle. Group II sherds displayed brown rims, underglaze-blue double lines, zigzag border, and underglaze-blue floral patterns including peony and lotus scroll. Underglaze-blue motifs characterized Group III, including sherds depicting a female figure, a figure of a boy, double lines, clouds, and landscape elements. Group IV consisted of an undecorated base with a grooved footrim, and Group V was distinguished by underglaze-blue trefoils and flowers, possibly of *Prunus* plants. Group VI was characterized by overglaze designs of red flowers, gilding and underglaze blue. A thunder or *key fret* pattern was used along with sectional markings. Lastly, Group VII contained a decorated footrim with underglaze-blue double lines. In addition to decoration analysis, manganese/cobalt testing was also performed on the sherds (Beals & Steele).

Analysis of Group I indicated that the calligraphy of the Chenghua reign mark is inconsistent with the bold style typical of the Chenghua, but rather resembles the style of the Kangxi reign. These sherds displayed several distinct characteristics including a wide foot, coarser porcelain than used in the Chenghua, and characteristics similar to typical Ming styles, such as flora motifs with thicker lines, glaze bubbles and opacity characteristics (Beals & Steele, 1981).

A majority of the characteristics in Group II indicated that the sherds were from the Transitional period or the Kangxi reign (Beals & Steele, 1981). The brown rims on the sherds were thought to be indicative of either Transitional or Kangxi period, as porcelain vessels dating to those periods were often edged with brown glaze to prevent chipping. The zigzag patterns in

Group II were also considered to be indicative of the Transitional period or the Kangxi reign, but could have also been attributed to the Xuande (1426-1435). The peony scroll and lotus scroll seen in the Group II collection could be attributed to a wide range of dynasties, including the Yongzheng, Wanli, Kangxi, Yongle, Xuande, and later 19<sup>th</sup>-century periods (Beals & Steele).

Groups III and V showed characteristics that were indicative of the Transitional or Kangxi period (Beals & Steele, 1981). The motifs, drawing style, and glaze attributes of Group III were characteristic of the Kangxi reign. The blue trefoils, flowers and the depiction of the *Prunus* plants indicated a Transitional period or Kangxi date for Group V. However, some of the characteristics could be attributed to the Ming dynasty as well. Despite this, the authors assigned a date close to the Kangxi reign, largely based on glaze used (Beals & Steele).

Groups IV and VI contained elements that indicated a possible date of the Wanli reign (Beals & Steele, 1981). Group IV was attributed to the Wanli reign due to the glaze type and heavy potting while characteristics of Group VI remained mixed and inconclusive. Group VI contained sherds of overglaze colors with red-overglaze flowers, overglaze gilding and underglaze blue, including key fret patterns and sectional markings. While the glaze characteristics and decoration placed the sherds in this group in the Wanli period or earlier, the gilding indicated a possible date to the Ming dynasty (Beals & Steele).

Lastly, Group VII that included a decorated footrim, was dated to the Shunzhi reign, during the Transitional period, due to consistency with that date and glaze, porcelain and color blue used (Beals & Steele, 1981).

In addition to the decorative analysis, Beals and Steele (1981) subjected 11 sherds to further testing, including manganese/cobalt ratio analysis and element analysis by way of emission spectroscopy. The manganese/cobalt ratio testing provided mixed results that, in some cases, contradicted the results of the design or glaze analysis. Element analysis provided possible dates in the Ming dynasty with possible indications of Japanese, Korean, or Persian origins. However, the results of the element analysis might have pointed heavily to the Ming dynasty simply because previous studies of this nature have been attempted on Ming dynasty porcelain and not other eras. There has been a general lack of study regarding the elemental make up of Qing dynasty samples (Beals & Steele).

Despite the inconsistencies between the various analysis methods regarding the reign of origin, Beals and Steele (1981) concluded that the majority of test results indicated manufacture between the Wanli reign and the Kangxi reign.

Woodward (1986) analyzed approximately 81 sherds of Chinese porcelain found in northern Tillamook County. His research focused on porcelain recovered from 3 locales: (a) unspecified mixed tidal regions in northern Tillamook County from which porcelain was collected on the surface; (b) Nehalem Bay Site 35-TI-4, the *north trail* on the northern perimeter of the site that consisted of a 65-80 cm deep stratified shell midden; and (c) Site 35-TI-4 portion of several housepits above the north trail, of which at least 2 yielded porcelain sherds.

Radiocarbon dates were obtained from the north trail stratified midden, dating the 40-50 cm depth to  $80\pm 50$  RCYBP, or between AD 1780 and AD 1870. Woodward concluded that the porcelain found in the 3 locations was Chinese in origin and possibly bound for export to Japan. He proposed that it was evidence of a Portuguese East Indiaman enroute to Japan, which drifted in ocean currents and wrecked off the Oregon Coast, possibly between 1630 and 1680.

Approximately 12 blue and white surface-collected sherds were recovered from mixed tidal areas and were subject to a large amount of comingling and redeposition (Woodward, 1986). Woodward noted that the Chinese underglaze-blue sherds from the mixed tidal area displayed brilliant underglaze-blue designs on a bright white body and attributed similar border designs to the private kilns at Jingdezhen during the Transitional period. Brown-rim dressings, double-blue lines above floral or landscapes, and unmarked bases with fused sand were visible on some of the sherds (Woodward).

Woodward (1986) attributed several of the characteristics of the mixed tidal surface collection sherds to the Kangxi reign. Two sherds displayed a single underglaze-blue line with a feathery flower design below. The size and shape of the sherds indicated that they might have been a portion of a goblet, typical in the Kangxi reign. Other features visible on the sherds that were indicative of this reign included the double-blue line above floral and landscape designs, the presence of the Chenghua mark and the Buddhist pair-of-fish emblem within a double ring.

The north trail portion of Site 35-TI-4 consisted of a stratified shell midden, 65-80 cm deep, located below the house sites (Woodward, 1986). The midden produced cultural material such as iron fragments, lithic debitage, shells and mammal bones, as well as bone artifacts. At a depth of 1.5 m, the lowermost cultural deposits were uncovered yielding 10 sherds of underglaze-blue porcelain, 4 sherds of white porcelain, and 2 glazed stoneware sherds. Woodward noted that one of the sherds recovered at this depth, a blue and white rim sherd, was stylistically identical to 5 blue sherds from Netarts site 35-TI-1, having underglaze blue and white, red overglaze and gold enamel (p. 230).

House Site 7 was located above the north trail and tidal estuary, on a hillside. Measuring  $17\text{ m} \times 87\text{ m}$ , it had cultural deposits at depths between 10 cm and 80 cm. A total of 57 sherds were found in addition to three flaked porcelain arrow points. Woodward (1986) suggested a range of dates including Transitional period, early Kangxi reign, Wanli reign, pre-Wanli (1500-1573) and pre-1500 (p. 234). House Site 8, located above House Site 7, measuring  $18\text{ m} \times 10\text{ m}$ , and 1.5 to 2 m deep, yielded approximately 18 Chinese porcelain sherds, 15 of which were found in the lower most cultural deposits and were not associated with any 19<sup>th</sup>-century artifacts (Woodward, 1986, p. 241). Sherds from this context displayed a cracked-ice pattern common in the Kangxi reign (Woodward, p. 248).

Scheans and Stenger (1990) noted that the Chinese porcelain from the Netarts site, 35-TI-1A, were of similar age to the porcelain found at Nehalem Bay, Site 35-TI-4. The Netarts porcelain appeared more thinly potted than those of Nehalem Bay. In addition, they reported that the Netarts porcelain sherds displayed a certain amount of nonfluidity in the execution of designs

and a lack of pale-blue background in the floral motifs. Brown rims were present on the sherds from Netarts Bay and indicated that the rims were colored twice. In contrast, the sherds at Nehalem Bay appeared to only have one application of brown to the rim, floral designs were generally fluid and the sherds displayed a use of blue washes. Scheans and Stenger stated that the difference between the two assemblages suggested that they were intended for different buyers, the Netarts Bay assemblage indicating manufacture intended for the European export market while the Nehalem Bay assemblage seemed to indicate that it was intended for the Asian market. Scheans and Stenger also noted that elemental profiles of the Netarts porcelain were needed in order to compare it to the Nehalem porcelain.

## **CHAPTER III STUDY SAMPLE AND METHODS**

### **STUDY SAMPLE**

This study focused on the Dubé Collection sherds, belonging to a private collector who found them on local beaches near Manzanita over several years. The collection numbers 1,189 sherds, collected between 1985 and 2008 from five separate locations (Figure 3). The number of sherds collected from each location was as follows: 770 from Oswald West State Park active tidal areas, 415 from Nehalem Bay, 2 from Tillamook Head, 1 from Tillamook Bay, and 1 from Nehalem Falls. In addition to the Dubé Collection, the Tillamook County Pioneer Museum housed a collection of 19 Chinese porcelain sherds. Although exact provenience was at times difficult to determine, it was confirmed that 13 of the Tillamook County Pioneer Museum's sherds were from Site 35-TI-4 at Nehalem Bay. In addition, records indicated that 5 sherds were donated and 1 sherd was from the Wilson River village site in northern Tillamook County.

A local resident of the Manzanita area allowed sherds she had collected to be measured and photographed as well. There were only 2 sherds, both found in the Nehalem Bay area. These sherds, as well as those from the Tillamook County Pioneer Museum, will be discussed in detail later and compared with sherds from the Dubé Collection.

### **METHODS**

A large portion of the study included a chronological and stylistic analysis of the private collection to infer the age and, if possible, the nationality of the Beeswax Wreck. Individual sherds were measured, using digital calipers, to the nearest hundredth of a millimeter and bagged with an artifact number written on the bag, rather than directly on the sherd. Small, undiagnostic sherds with similar attributes were bagged as lots and assigned a single artifact number, while diagnostic sherds were individually bagged and numbered. Information regarding each sherd or lot was recorded in spreadsheet format.

The degree of erosion that the sherds sustained was recorded in order to further explore the difference in depositional context of the locations. Sherd erosion and breakage was defined as seen in Table 2.

When possible, sherd type was determined and categorized as base, body, lid, neck, or rim sherds. The base population was broken into three categories: (a) simple base, (b) base with grooved footrim, and (c) high footrim. The simple base category was used for bases that have a rather simple and nondescript footrim, or for instances in which erosion made any other identification impossible. The grooved footrim is a very obvious and striking contrast to other bases in the collection, having what appears to be a double footrim, or an exterior portion of the footrim, a trough, and an interior portion of the footrim. High footrims were those measuring 10 mm to 15 mm in height.

Rim sherds were defined in three separate categories: (a) everted rims—flaring outward from the vessel body, (b) straight rims—vertically straight, and (c) wide flat rims—both everted and flattened. A discrepancy between sources existed when it came to the description and categorization of wide flat rims. Some sources, referred to wide flat

**Table 2: Definitions of Breakage and Erosion Classifications**

| Breakage type       | Definition   |
|---------------------|--|
| Clean breaks        | Edges show no erosion whatsoever; sharp edges, features fully intact.  |
| Slightly eroded     | Overall have freshly broken appearances, however, sharp edges are somewhat worn down or slightly rounded. Features such as footrims, and everted rims are still fully intact.  |
| Moderately eroded   | Edges are rounded; features such as footrims and everted rims are worn down, and the glaze is or is not present, but, if present, does not cover the entire sherd or retain a glossy texture. Blue underglaze is still intact. |
| Severely eroded     | Edges are rounded; features such as footrims, everted rims are severely worn down or no longer present. Glaze is present only in rare cases and blue underglaze is often eroded having a faded appearance.                     |
| Culturally modified | Edges of the sherds have evidence of being worked or flaked.   |
| Atypical breakage   | Edges are shaped in way that looked to be neither culturally modified, nor naturally broken through ware, but the exact cause of which is unknown.   |

rims on dishes as *klapmutsen* rims (Fischell, 1987), *klapmutsen* being a Dutch word referring to the unique rim style that appeared in European exports during the Transitional period, roughly between 1620 and 1680 (Fischell; van der Pijl-Ketel, 1982). However, some sources differentiated between general wide flat rims and *klapmutsen*, defining *klapmutsen* as being a certain depth of dish (van der Pijl-Ketel).

For the purposes of this study, a general description of cobalt tone was made for each underglaze-blue sherd. However, a great deal of emphasis was not placed on cobalt color due to the contradictory information in existing literature regarding when certain cobalt tones were used, and the subjective nature of color determination. It was included for the purposes of this study as a general observation.

Glaze condition was categorized three ways: (a) fully intact—retaining a glossy appearance and covering all intended surfaces of the sherd; (b) eroded—retaining glaze only in protected areas of the sherd such as near the footrim or base (eroded glaze appears glossy at times; however, often takes on a gritty and bubbled appearance, with sand accretions inside the



exposed bubbles); (c) stained—likely the result of deposition either in oils, or greases, possibly from midden sites, or iron oxides. The primary focus regarding glaze attributes was glaze tone and texture. These two attributes are often indicative of the time period during which the porcelain was produced (Frank, 1969). However, much like cobalt tone, the information regarding glaze tone is often contradictory and, at times, very subjective as glaze tone is subtle.

The fragmentary nature of the collection often made it impossible to determine the vessel type and, therefore, a more general classification of vessel form was used as a first step in vessel identification. Sherds were either identified as being from *open-form vessels*, such as plates, bowls and cups, or *closed-form vessels*, such as vases and flasks. Often, the morphology of the sherd allowed for identification beyond vessel form, lending more complete detail and, at times, the designation of a true vessel type.

Decoration type was classified into two categories: *primary decoration* and *secondary decoration*. These two separate categories of decoration were used in order to keep categories as simple as possible, and to allow for direct comparison of design combinations. Although “primary” and “secondary” were used to describe the two decoration designations, it is not intended to suggest that one decorative motif was more important to a vessel’s aesthetic impact. The designation was arbitrary and used for ease of comparison only. The primary decoration category was used to classify the presence or absence of painted decoration in (a) blue underglaze—a cobalt based pigment applied on the body of the vessel before firing and glazing, (b) red overglaze—a red iron-based enamel applied over the glaze requiring a second firing (Kerr, 1986), (c) blue underglaze with red overglaze, or (d) monochrome.

Secondary decoration focused on nonpainted decoration and slips. These included *incised*, *ribbed*, *molded*, and *brown slip*. Incised motifs are a type of decoration that was carved into the vessel body with an implement, usually bamboo (Donnelly, 1967). Molded decorations, those created by pouring porcelain clay into molds, take on many forms—anything from figures, applied motifs, and simple variations of vessel shape (Donnelly). Ribbing, or fluting as it is sometimes called (Donnelly), gives the vessel the look of having vertical ribs and scalloped edges. It is important to note that ribbed decoration is a form of molded decoration, but, the distinction is made here in order to differentiate the uniquely ribbed sherds from other molded motifs. Slips are a monochromatic, opaque pigment applied to the vessel.

Motif is one of the key attributes used to determine a date of manufacture for Chinese porcelain (Frank, 1969; Mudge, 1986), and in keeping with the example of many experts, was the focus of this study as well. The determination of motif was a simple systematic process of observation and photography, combined with research and comparison of porcelain styles and motifs. While many previous studies have relied a great deal on sources which discuss trends among Imperial Chinese porcelain (Curtis, 1995; Lion-Goldschmidt, 1978), an effort was made here to include both Imperial porcelain sources and shipwreck cargo resources. The intent in doing so was to strike a balance in research between the trend-setting Imperial factories and the less restricted world of export porcelain production.

The minimum number of vessels (MNV) was determined for the Dubé Collection. This was calculated by considering the number of bases found, in addition to unique motifs that were not associated with base sherds.

Once the analysis of the Dubé Collection sherds was completed, the collection from the Tillamook County Museum was analyzed. The same analytical methods were used; however, original artifact numbers, when present, were used for reference.

Data from the analyses were used to establish a date range of manufacture of the porcelain, nationality of the Beeswax Wreck, and the market for which the porcelain was intended. In determining the porcelain's date of manufacture, a total of 13 attributes and porcelain types were used to suggest a date range using South's (2002) model of visual interpretation. Additionally, 11 attributes and types were used to establish a mean ceramic date, or weighted average, for the Dubé Collection using South's (2002) equation. Those attributes and types excluded from the visual interpretation and mean ceramic date calculation were later compared to both methods in order to confirm or refine the date generated.

Moreover, the porcelain analysis was examined in the context of artifacts associated with the Beeswax Wreck—beeswax and the oleum jar—as well as known historical dates. Additionally, the date range generated by the Dubé Collection analysis was compared to Erlandson et al.'s (2001) refined date range, which was based on radiocarbon dates, historical information, and archaeological data. The information generated by the analysis was used to provide detail regarding the destination and nationality of the Beeswax Wreck, as well as suggest which of the two shipwreck identities proposed by Williams (2006) is most likely to be the source of the porcelain deposition.

## CHAPTER IV RESULTS

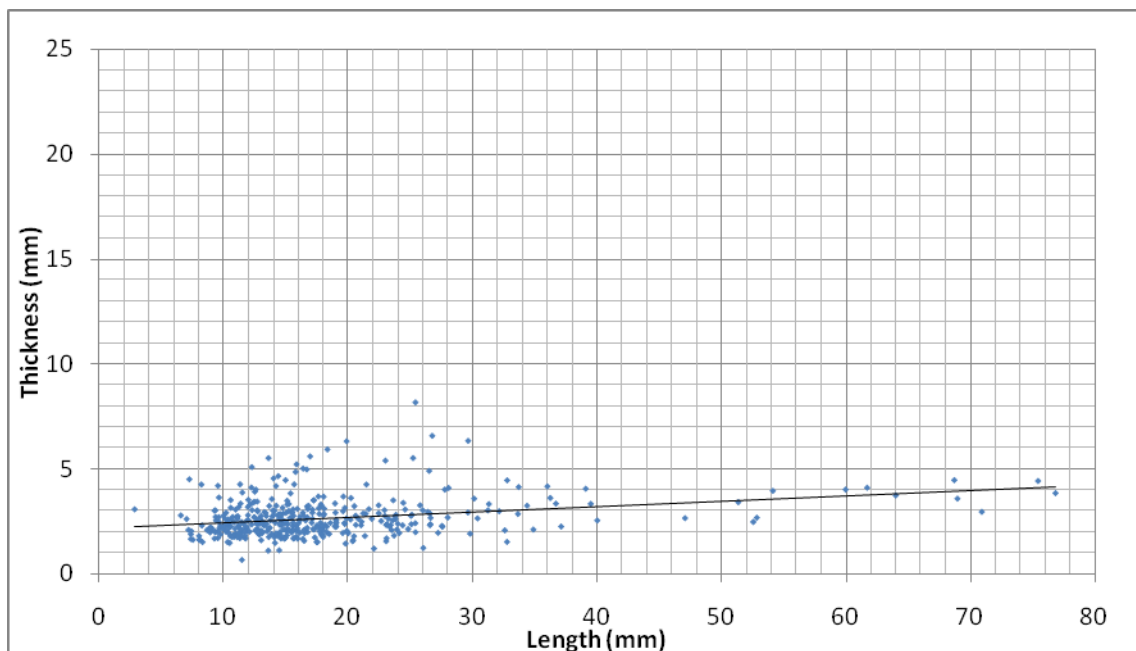
### **IDENTIFICATION OF ATTRIBUTES AND PORCELAIN TYPES**

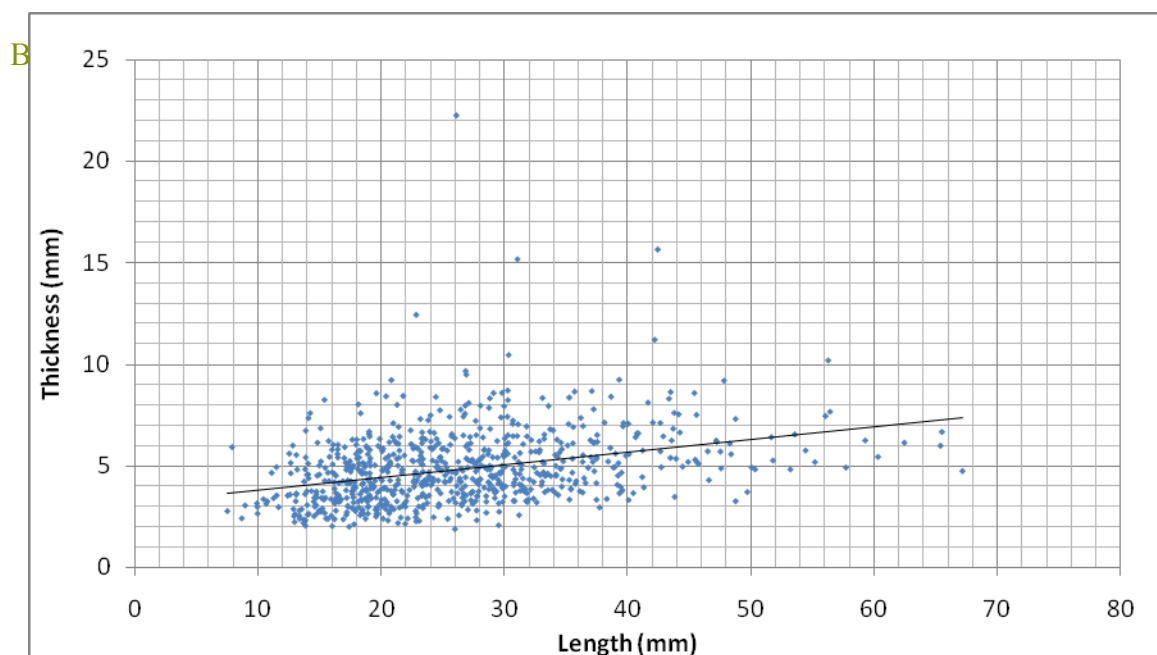
As mentioned, most of the sherds were collected from Oswald West State Park, numbering 770 sherds, and Nehalem Bay, numbering 415 sherds. The following discussion will often compare the sherds collected from these two separate locations while, at times, omitting the smaller samples from Tillamook Head, Tillamook Bay, and Nehalem Falls. Of the total 1,189 Dubé Collection sherds, 1,182 were positively identified as antique porcelain, having dense vitrified bodies with few imperfections. The remaining 7 sherds were listed as “suspect.” The suspect sherds may in fact be porcelain; however, they appear more porous, are lighter in weight, and have a mechanically manufactured or molded look to features such as footrims. In addition, suspect sherds have very glossy, clear glaze that was highly distinguishable from glazes used in antiquity.

Measurements of the greatest length and the thickness of each sherd in the Dubé Collection were recorded. The sherds average 23.2 mm in length, ranging from 2.9 mm to 76.8 mm. Average sherd thickness is 4.0 mm, and ranges from 0.6 mm to 22.3 mm.

As Figure 4 illustrates, the Oswald West State Park sherds are, on average, both thicker and longer than the sherds from Nehalem Bay. Nehalem Bay sherds, average only 18.0 mm in length and 2.6 mm in thickness, while the Oswald West State Park Sherds average 26.0 mm in length and 4.8 mm in thickness. This indicated that the Oswald West sherds are nearly twice as thick as Nehalem Bay sherds, and 30% larger on average. However, comparison of the lengths and thicknesses of the Nehalem Bay sherds and the

A





**Figure 4: Length and thickness comparison of Dubé Collection sherds from Nehalem Bay and Oswald West State Park. (A) Length and thickness of Nehalem Bay sherds. (B) Length and thickness of Oswald West State Park sherds.**

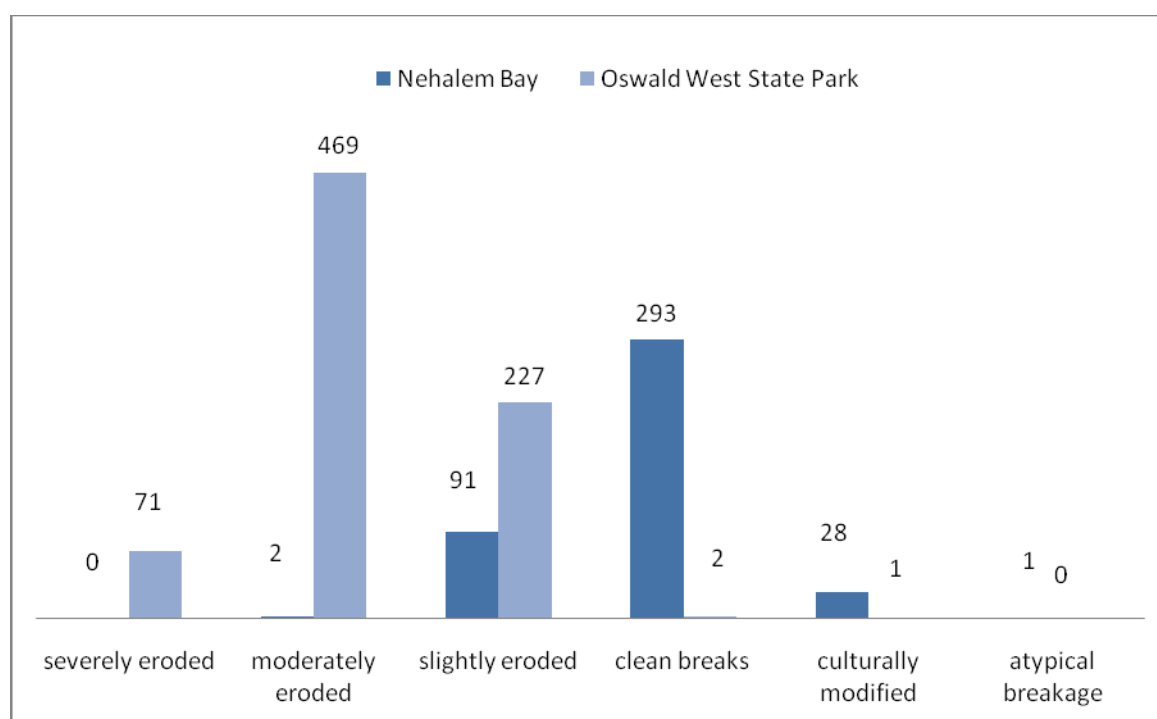
Oswald West State Park sherds indicated that, despite the averages, Nehalem Bay produced sherds with the greatest variation in length and the smallest variation in thickness. In contrast, Oswald West State Park produced sherds with less variation in length, but a greater variation in thickness than those of Nehalem Bay. Average length and thickness measurements were not calculated for Nehalem Falls, Tillamook Bay, and Tillamook Head as they only yielded 1 to 2 sherds at each location.

Although the difference in the length and thickness between the two locations was not enormous, it provided insight into the overall occurrence and survival of certain sherds between the two locations. For the overall collection, Oswald West State Park produced the least amount of length variation, but the thickest sherds of the collection. Conversely, Nehalem Bay provided a larger variation of sherd length, representing both the longest and the thinnest sherds.

From this, the depositional difference between the two locations became obvious. Shorts Sands Beach, a mixed tidal region in which the porcelain was subjected to erosion and breakage from waves, sand, and cobbles, had provided an environment that greatly reduced the size variation of the sherds, and favored the survival of the heavier portions of vessels or more thickly potted vessels. There were, however, a few instances in which porcelain has been found wedged in cobble at Oswald West State Park (J. Dubé, personal communication, May 6, 2008), and this occurrence might have been responsible for the few Oswald West State Park sherds that have cleaner breaks. Nehalem Bay is quite opposite of the Oswald West State Park environment. A bay area with mud flats and significantly less erosive features, it seems to allow for the protection of larger, thinner sherds. These sherds were being protected by both the mud and rock

cobble, some of the largest pieces having been found wedged tightly between rock cobbles (J. Dubé, personal communication, May 6, 2008). The small pieces found at Nehalem Bay were found among the tidal mudflats along with other fine debris, and seem to be the result of natural sorting by the water overtime (J. Dubé, personal communication, May 6, 2008).

The degree of erosion varies over the entire population, but is generally similar by provenience, confirming the pattern suggested by the length and thickness of the sherds (see Figure 5). Nehalem Bay produced sherds that were mostly clean-broken with no visible erosion, as well as the greatest percentage of culturally modified sherds. None of the sherds collected from Nehalem Bay were classified as being severely eroded. The sherds from Oswald West State Park display a very different pattern of erosion. The great



**Figure 5: Comparison of breakage type and degree of erosion exhibited by sherds from Oswald West State Park and Nehalem Bay.**

majority of sherds from Oswald West State Park have a significant amount of erosion, yielding very few sherds that were either culturally modified or cleanly broken.

The differences in erosion were not altogether surprising. Rather, it simply reinforced the differences in depositional environments suggested by the length and thickness comparisons. Oswald West State Park, being a more active and violent environment, was clearly reducing the sherds over time while Nehalem Bay was protecting them to some degree. The presence of more culturally modified sherds at Nehalem Bay was logical, as the excavation of Cronin's Point Site 35-TI-4 established the presence of Native Americans and their use of porcelain as arrow points. Only a single culturally modified sherd was recovered from Oswald West State Park, and

although there are no excavated archaeological sites at this beach, at least one shell midden is present, confirming its use by aboriginal people (J. Dubé, personal communication, February 15, 2008). It should also be noted that none of the sherds have marine accretions often observed in shipwreck porcelain cargos. Marine accretions usually occur where the porcelain was exposed on the ocean floor as opposed to being buried beneath the sand (Jorg & Flecker, 2001; Sheaf & Kilburn, 1988).

### SHERD TYPE

Sherd type was identifiable on 85% of the Dubé Collection. From the analysis, it was clear that Nehalem Bay and Oswald West State Park were very similar in regards to the sherd types that made up their populations, with only a few exceptions (see Table 3). Concerning the entirety of the Dubé Collection, body sherds are by far the most common, comprising 42% of the identifiable population, followed by bases at 26%. All grooved-

**Table 3: Sherd Type Distribution**

| Sherd type            | Nehalem Bay | Nehalem Falls | Oswald West State Park | Tillamook Bay | Tillamook Head | Total sherds |                |
|-----------------------|-------------|---------------|------------------------|---------------|----------------|--------------|----------------|
|                       |             |               |                        |               |                | No.          | % <sup>a</sup> |
| Base, simple          | 24          |               | 272                    |               |                | 296          | 24.89          |
| Base, grooved footrim |             |               | 17                     |               |                | 17           | 1.42           |
| Base, high footrim    | 4           |               |                        |               |                | 4            | 0.33           |
| Body                  | 184         | 1             | 317                    | 1             | 1              | 504          | 42.38          |
| Lid                   | 9           |               | 12                     |               |                | 21           | 1.76           |
| Neck                  |             |               | 1                      |               |                | 1            | 0.08           |
| Rim, everted foliated |             |               |                        |               | 1              | 1            | 0.08           |
| Rim , everted         | 26          |               | 16                     |               |                | 42           | 3.53           |
| Rim, straight         | 73          |               | 42                     |               |                | 115          | 9.67           |
| Rim, wide flat        | 3           |               | 3                      |               |                | 6            | 0.50           |
| Unknown               | 92          |               | 90                     |               |                | 182          | 15.30          |
| Total sherds          | 415         | 1             | 770                    | 1             | 2              | 1,189        | 100.00         |

*Note.* Data represent the number of sherds recovered from each location for which a sherd type could be assigned.

<sup>a</sup> Percentage of entire collection.

footrim sherds are monochrome sherds, the footrim of which appears almost to be a double footrim, having what resembles an exterior footrim, a trough, and an interior footrim. On more eroded sherds, the grooved footrim appears to be more of a small groove with a less visible trough, the groove being quite underdeveloped and narrow. It is also possible that the narrow appearance of the grooved footrim is simply a double footrim that has been eroded down. High-footrim bases among the Dubé Collection range from approximately 10 mm to 15 mm in height and were exposed to considerably less erosion due to deposition, allowing for this feature to remain preserved.

Rim sherds are also present in a rather large quantity, accounting for 13% of the total sherd population. Vertically straight rims were by far the most common of the rim sherds identified followed by everted rims, which flare outward from the vessel wall. Only a single sherd from Tillamook Head was identified as being both everted and foliated while 6 sherds were identified as being wide flat rims or klapmutsen-like rims.

Sherd type distribution between Nehalem Bay and Oswald West State Park was, for the most part, somewhat similar. However, Oswald West State Park had more bases, body sherds, and lids than did Nehalem Bay (Table 3). In addition, Oswald West State Park produced the only examples of grooved footrims, and the only neck sherd in the Dubé Collection. Conversely, Nehalem Bay produced more everted rims, straight rims, the only examples of bases with high footrims, as well as the greatest number of sherds that could not be identified.

Exploration of sherd type identified two attributes for which a date could be assigned. The first is the grooved-footrim sherds found at Oswald West State Park (see Figure 6). The grooved footrim is exceptional in that it was only produced for a short number of years, beginning as an *embryonic-grooved footrim* during the Shunzhi reign (1644-1661) (Butler, 2002, p. 22; Curtis, 2002, p. 163) and seen fully developed anywhere from 1670-1690 (Butler & Curtis; Donnelly, 1967; Harrison, 1995; Mudge, 1986), however, many attribute 1670 as the start date of fully developed grooved-footrim production (Curtis, 1995). It is unknown what purpose the grooved footrims served; however, Harrison suggested that it might have been used to prevent slipping. She did not elaborate on this suggestion. Blue-underglaze porcelain with the grooved footrim was usually produced at Jingdezhen (Harrison); however, Donnelly (1967) noted the grooved footrim among monochrome porcelain from the Dehua kilns during the same period. He gave the example of several monochrome-white wine cups dating roughly from 1675 to 1725 (Donnelly). In the case of the grooved footrims on monochrome wine cups, it is appropriate to attribute the cups to the early portion of the date range provided by Donnelly, as vessels with grooved footrims were seen as late as 1690, but not after (Harrison).



**Figure 6: Sherd NH269 from Oswald West State Park, an example of monochrome-white, ribbed porcelain with a grooved footrim.**

The majority of Dubé Collection grooved-footrim sherds appear only to have a narrow groove that could indicate a Shunzhi reign date; however, the narrow appearance of the groove could also be an illusion caused by erosion. Sherd NH296 is the least eroded example (Figure 6). The footrim appears developed, nearly a double footrim; however, it is also similar to bases which Butler and Curtis (2002, p. 163) called an embryonic footrim of the Shunzhi reign. Harrisson (1995) contradicted this by providing similar examples that she referred to as fully developed bases of the Kangxi reign. Because of this contradiction, the grooved footrims of the Dubé Collection were given a wide date range of 1644-1690, encompassing both the Shunzhi reign and the first portion of the Kangxi reign up until 1690, after which the grooved footrim was no longer produced (Harrisson).

The second feature identified on sherds for which a date could be determined is the *klapmutsen*, or wide flat rims. There was contradicting information regarding *klapmutsen* and wide flat rims that made determining an exact date for the attribute impossible. Fischell (1987)



attributed *klapmutsen* to the time period between 1620 and 1680; however, its presence among the *Witte Leeuw* cargo of 1613 was well documented (van der Pijl-Ketel, 1982). According to van der Pijl-Ketel, *klapmutsen* was limited to a shallow bowl with wide flat rims, while Fischell attributed this name to a broader spectrum of vessel types. This discrepancy in date is likely the product, and an example of the confusion, caused by unclear definitions among existing resources and research. Regardless, the depth of the bowl, or the difference between a bowl and a dish, is difficult to determine, especially as in the case of the Dubé Collection where vessels are highly fragmented.

## COBALT

The cobalt color on underglaze-blue porcelain has long been used as a means of determining date (Frank, 1969). Cobalt decoration in the Dubé Collection is consistent throughout in that all underglaze-blue sherds appear to be painted in an outline and wash technique. The cobalt occasionally appears runny, and at times, collected in portions of the decoration, with an absolute lack of the classic *heaped and piled* technique used during the Ming dynasty reigns of Xuande (1426-1435) and Yongle (1403-1424), or the Qing dynasty reign of Yongzheng (1723-1735). The lack of the heaped and piled look is indicative that the potters at the time the Dubé Collection was manufactured were using highly refined cobalt (Frank).

It should also be noted that while observations of cobalt tone were possible for most of the sherds in this collection, there were conditions that made it difficult to determine subtleties of tone. Many of the sherds have sustained a great deal of erosion and, therefore, cobalt is at times eroded to the degree that subtleties of tone are no longer distinguishable. In addition, depositional staining on a few occasions obscured the true cobalt color. In total, there were 53 sherds for which cobalt tone was unobservable due to erosion. Not surprisingly, 47 of these sherds were found at Oswald West State Park, the location that subjected the sherds to the most erosive conditions. Only 6 sherds from Nehalem Bay could not be classified because of erosion. In addition, there were also 2 sherds from the Bay location that could not be classified because of staining—the cobalt color and application having been obscured by a brown, or rust colored stain.

The distribution of various cobalt tones was nearly identical between Oswald West State Park and Nehalem Bay. The overall trend between the two locations was a large number of sherds with blue-violet cobalt, accounting for 52% of the collection, and violet-toned cobalt, accounting for 10%. Violet cobalt is generally associated with the Transitional period (1620-1683), while blue-violet cobalt is characteristic of two particular periods of porcelain production including the Jiajing (1522-1566) (Macintosh, 1977) and the Kangxi (Frank, 1969). However, sherds in the Dubé Collection do not appear to be characteristic of the Jiajing reign porcelain because they lack the gray paste and oily textured glaze characteristic of the period (Frank).

Smaller numbers of violet-gray, blue-gray, blue-black, and bright blue were also observed in both locations, violet-gray comprising only 4% of the collection, blue-gray 0.6%, blue-black, 0.2%, and bright-blue, 0.2%. These tones are associated with a number of different time periods, including both Ming dynasty and Qing dynasty periods. Black-toned and gray-

toned cobalts were used during the Hongwu (1368-1398), Hongzhi (1488-1505), Yongzheng (1723-1735), and Qianlong (1736-1795). However, the Dubé Collection sherds are likely not associated with the Yongzheng reign as it was common during that period to imitate the heaped and piled affect of Ming porcelain (Frank, 1969), and this was not observed among the Dubé Collection sherds. Bright-blue cobalt was common during the Ming dynasty reign of Xuande, as well as during the Kangxi (Frank, 1969). Light or pale cobalt application, often associated with the Chenghua (1465-1487) (Macintosh, 1977) and Wanli reigns (1573-1620) (Frank), was seen less frequently but still existed in some numbers in both locations. Accounting for 7% of the collection, light application was observed in light blue, light blue-violet, and a light-violet tone. Lastly, a dark or heavy application of cobalt, common during the Shunzhi reign (Curtis, 2002, p. 42), was seen on the fewest number of sherds, comprising 3% of the collection.

Analysis of cobalt tone produced a wide range of possible dates that appeared overwhelming at first glance. However, the greatest number of sherds in the Dubé Collection are associated with various cobalt tones common to the Transitional period and the Kangxi reign. Only a small number of black-toned cobalt sherds and light application sherds are present. These tones are often associated with Ming dynasty periods. While many sources placed a great deal of emphasis on cobalt tone in determining porcelain production dates, Lion-Goldschmidt (1978) warned against doing so. She noted that firing conditions, such as smoke and soot in the kiln, temperature, and the amount of air could affect the end color of the cobalt underglaze to a great degree (Lion-Goldschmidt). Lion-Goldschmidt noted that since cobalt color and chemical composition could vary to such a degree cobalt color should not be used in determining provenience or the time period from which the vessel came (p. 21). For this reason, as well as the subjective, and inconclusive—often contradictory—nature of existing literature regarding cobalt tone of Chinese porcelain, a large emphasis was not placed on cobalt tone in determining a date range for the Dubé Collection.

## **GLAZE**

During the analysis of the Dubé Collection sherds, careful observations were made of glaze attributes. While observation of glaze attributes remained the central focus, the condition of the glaze was also noted. Glaze was identified on 46% of the collection. Of that population, 72% are fully intact, 27% are eroded, and 1% is stained. Nehalem Bay produced the greatest number of sherds that retained glaze, the majority having fully intact glaze. The greatest number of stained sherds was also recovered from the Bay. In contrast, Oswald West State Park had very few sherds on which glaze is fully intact, and the majority tends to either have no glaze remaining, or eroded glaze (see Table 4). The difference in glaze preservation between Oswald West State Park and Nehalem Bay was not unexpected, and confirmed the pattern established by the length and thickness comparisons, as well as breakage type and amount of erosion observed on the sherds from each location.

**Table 4: Glaze Condition Distribution**

| Glaze condition | Nehalem Bay | Nehalem Falls | Oswald West State Park | Tillamook Bay | Tillamook Head | Total sherds |
|-----------------|-------------|---------------|------------------------|---------------|----------------|--------------|
| No glaze        | 2           |               | 637                    |               |                | 639          |
| Eroded glaze    | 17          |               | 129                    |               |                | 146          |
| Intact glaze    | 387         | 1             | 3                      | 1             | 2              | 394          |
| Stained glaze   | 9           |               | 1                      |               |                | 10           |

*Note.* Data represent number of sherds recovered from each location.

Glaze was found to occur in six general tones: blue, green, light-green, light-yellow, white, or clear. Green-toned glaze was by far the most common tone of glaze observed, accounting for 82% of sherds with eroded or fully intact glaze. Both the Ming and Qing dynasties are associated with green-toned glazes; however, Ming dynasty green glazes often have textural attributes as well: The Yongle reign glaze has a runny appearance (Frank, 1969), the Xuande reign glaze has an orange peel texture (Frank), and the Hongzhi reign has thick green glaze that seems to smother the blue underglaze (Frank). In addition, the Zhengde (1506-1521) porcelain has green glaze that blurs the motif beneath it, the Jiajing glaze is an oily-textured green glaze that also blurs the underglaze blue, and the Wanli glaze is a green glaze that tends to flake away from the porcelain. The Dubé Collection sherds with green glaze do not exhibit any of the textural elements of the Ming dynasty green glazes. Rather they are of a subtle green tone, thinly applied, with no obstruction of the underglaze decoration beneath the glaze. These features are far more similar to the green glazes of the Transitional period and the Kangxi reign (Frank; Macintosh, 1977).

While most existing literature seemed to agree on the attributes of Ming dynasty glaze, there was disagreement regarding the nature of the various phases of Kangxi reign glazes. Both Frank (1969) and Kerr (1986) suggested that Kangxi glaze was white or clear, particularly in the case of mid-Kangxi export glaze. However, Macintosh (1977) stated that the mid-Kangxi glaze (1683-1710) was, at times, blue or green. The lack of consensus regarding the Kangxi glaze made it difficult to assign a date range to the Dubé Collection based upon glaze attributes. Rather, it could only be said that the green-toned glaze of the Dubé Collection was not likely produced during the Ming dynasty.

White-toned glaze was observed among the Dubé Collection sherds and accounted for 15% of the glazed sherds. The white-toned glaze was unique among the glazes in that it was the most subtle glaze, nearly blending with porcelain body and, at times, only distinguishable from the porcelain body by its sheen. White-toned glaze was commonly observed on monochrome-white porcelain. The Dehua kilns in particular were using a cold white glaze during the 18<sup>th</sup> century (Donnelly, 1967). Other glaze tones identified among the Dubé Collection include clear, glossy glaze present on only 3 sherds, a blue-toned glaze observed on only 1 sherd, and light-

yellow glaze observed on only 1 sherd. The 3 sherds having a clear glossy glaze, Sherds NH134 and NH171 (a lot of 2 sherds), have a crackled, flaky appearance to the glaze. Although a clear glaze could be indicative of the Kangxi (Macintosh, 1977), these sherds appeared more modern in both glaze and shape than did the other sherds, and, therefore, are highly unlikely to have been contemporary with the remainder of the Dubé Collection.

Some 14 sherds that appear contemporary with the collection have a crackled appearance to the glaze. Only 2 of these sherds are blue underglaze, with the remainder being monochrome-white porcelain sherds. This crackled appearance is noteworthy, especially on the white ware, as it is often indicative of manufacture at the Imperial kilns at Jingdezhen (Donnelly, 1967) as apposed to Dehua, which rarely produced a crackled glaze (Donnelly). The crackled appearance of the Dubé Collection sherds, however, is likely a produced by erosion and break down of the glaze.

The presence or absence of glaze on bases was another important consideration since these features help pinpoint a date range. Unglazed bases have often been identified by the color of the base, since a lack of glaze allowed the base to burn an apricot color when fired (Frank, 1969). Most bases in the Dubé Collection are glazed. Even those for which the majority of the glaze has been eroded, glaze still adheres to portions of the footrim or protected areas of the base thus indicating they had been glazed at one time. This attribute is highly important when determining a date range for Chinese porcelain, as Ming dynasty porcelain often had unglazed bases, the practice continuing until the end of the Shunzhi reign (1644-1661) of the Qing dynasty. In fact, is rare to see unglazed bases on Chinese porcelain after the end of the Shunzhi (Butler, 2002, p. 21).

Only two sherds in lot NH652 indicate that they are indeed true unglazed bases, having a mild discoloration and unique curdled appearance. This is interesting in two ways. First, unglazed bases can be indicative of Ming dynasty or High-Transitional porcelain in some cases (Butler, 2002, p. 21). However, the unglazed base sherds in the Dubé Collection are from small globular boxes. These globular boxes were described by Donnelly (1967) in his examination of Dehua porcelain as unique in that, during the post-Transitional period and height of the Dehua production, small globular boxes with unglazed, curdled bases were being produced (Donnelly) when unglazed bases were out of fashion for other porcelain vessels (Butler, p. 21). This, Donnelly noted, was indicative of the boxes origin at the Dehua kilns between 1675 and 1725.

In summary, glaze attributes of the Dubé Collection sherds range widely. However, the majority of the sherds display a non-obstructive, subtle green glaze that lacks the textural features and thickness of Ming dynasty green glazes. Dubé Collection green glaze is more similar to Transitional period (1620-1683) or Kangxi reign (1662-1722) glazes (Frank, 1969), although the true character of Kangxi glaze has been disputed (Frank; Kerr, 1986; Macintosh, 1977). While the other glaze tones are not particularly diagnostic in regards to date, glaze presence on bases highly suggested a date after the end of the Shunzhi reign (1644-1661). In addition, the identification of unglazed, curdled bases on two globular boxes suggested their production at the Dehua kilns, peak production of which was during 1675-1725 (Donnelly, 1967).

## VESSEL FORM AND TYPE

The fragmentary nature of the collection often made it impossible to determine the vessel type and, therefore, a more general classification of vessel form was used as a first step in vessel identification. Many of the open-form sherds were identified by the presence of decoration, usually in underglaze blue, on both sides of the sherd, thus indicating that both the interior and exterior of the vessel were meant to be seen. Although it may seem logical that the presence of glaze on both the interior and exterior of the sherds could have been used in much the same manner when determining if a vessel was open form, it was not diagnostic of an open-form vessel. During the manufacture of porcelain pieces, potters would dip the porcelain into tubs of glaze, coating the outside, without leaving the stroke marks a brushed application would leave. As they did this, they made certain glaze flowed inside the vessel as well, swirling the glaze to coat the interior (van der Pijl-Ketel, 1982) of both closed and open-form vessels alike. Rim sherds presented a specific problem when it came to determining vessel form. Since it was not overly uncommon to have border patterns on the interior of both closed-form and open-form vessels, decoration was not the only criteria used to determine vessel form of rim sherds. In addition to decoration, features such as curvature of the sherd, which suggested circumference, in combination with potting and rim style, were also considered.

Open form was by far the most commonly identified vessel type and accounts for 20% of the collection, followed by closed form, which make up only 2% of the Dubé Collection. The remaining 78% of the Dubé Collection could not be identified by vessel form. The locations from which the Dubé Collection had been found displayed no remarkable differences in regards to the distribution of various vessel forms (see Table 5). Although there were minor differences in the exact numbers of each vessel form, the overall percentage composition of both Oswald West State Park and Nehalem Bay were remarkably similar.

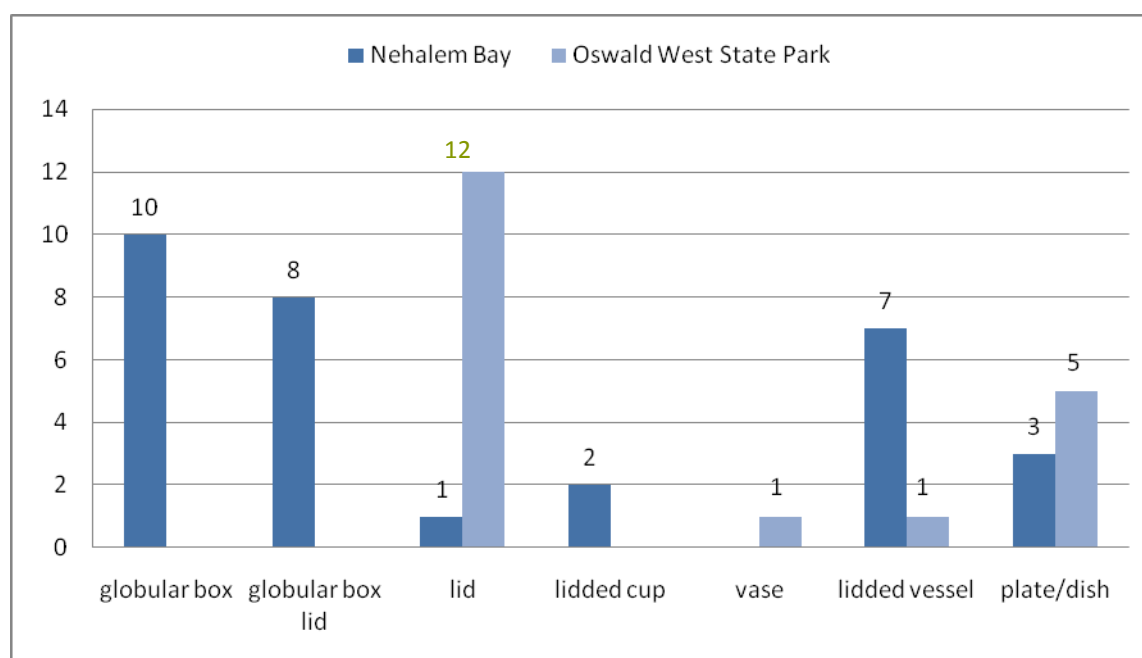
For the Oswald West State Park population, 82% could not be identified as to vessel form, 18% are open-form vessels and 0.12% is closed form. Similarly, the Nehalem Bay population were 70% unidentifiable, 26% are open-form sherds and 4% are closed-form sherds.

**Table 5: Vessel Form Classification by Provenience**

| Vessel form | Nehalem Bay | Nehalem Falls | Oswald West State Park | Tillamook Bay | Tillamook Head | Total sherds |
|-------------|-------------|---------------|------------------------|---------------|----------------|--------------|
| Closed form | 18          |               | 1                      |               |                | 19           |
| Open form   | 106         | 1             | 136                    |               | 1              | 244          |
| Unknown     | 291         |               | 633                    | 1             | 1              | 926          |

*Note.* Data represent number of sherds recovered from each location.

On a few occasions, identification was possible beyond vessel form, lending more complete detail and, at times, the designation of a true vessel type (see Figure 7). Among these identifiable vessel forms are 8 lidded vessels, identifiable by a groove on the interior of the rim indented to accommodate a lid. The groove on the rims of these sherds ranges from 4.3 mm to 6.7 mm in height. In addition to the lidded vessels, 2 sherds, both found at Nehalem Bay, were determined to be lidded cups. Sherd NH493 is a large sherd comprising nearly one-quarter of the original vessel. Decorated in underglaze-blue floral scroll, the sherd appears to be a medium sized cup with a groove for a lid on the interior of the rim. Although much smaller, Sherd NH502 is very similar in potting and appears to be from a vessel of approximately the same size as Sherd NH493 (see Figure8). It is also decorated in a underglaze-blue floral scroll. Similar lidded cups were observed among the *Vung Tau* cargo of 1690 (Jorg & Flecker, 2001).



**Figure 7: Vessel type distribution for the Dubé Collection sherds. Data represent the total number of sherds recovered from each location for which a vessel-type classification was possible.**

When the lidded-cup sherds were compared to the lidded-vessel sherds, it appeared highly likely that the majority of those classified as lidded vessels are actually lidded cups as well. The thickness of potting and curvature of the rims suggests that the sherds were from approximately the same sized vessels. In addition, the interior grooves of the rims are all of a similar size. The lidded-cup grooves measure 4.4 mm and 6.5 mm—well within the range of variation among the lidded-vessel sherds’ grooves, which measure 4.3 to 6.7 mm. Motifs among the lidded-vessel sherds and lidded-cups sherds are also strikingly similar, all having an underglaze-blue floral scroll. Two sherds in particular were so similar they appear to be from the same vessel, or from two vessels painted nearly identically: NH502 and NH507 both represent the same portion of the same floral-scroll motif, appearing nearly identical in shading, and



**Figure 8: Interior of lidded-cup Sherd NH502 from Nehalem Bay. The interior shows a groove, measuring 6.5 mm in height, to accommodate a lid.**

outline and wash technique. In the light of these similarities it appeared highly likely most of the lidded-vessel sherds are indeed lidded cups, although in cannot not be said with 100% certainty.

There is a single lidded-vessel sherd that stands out from among the others. The sherd appears from a more thickly potted vessel and may not be from a lidded cup. Its rim curvature suggests a larger circumference and the floral motif with which it is decorated is somewhat different from the rest of the lidded-vessel group. It is possible that this sherd was from a jar or large lidded vase of some sort, or perhaps it is simply a much larger lidded cup.

A total of 13 vessel lids were identified among the collection. These sherds were identified by their general curvature, motif, presence of knobs or handles, as well as ledges on the interior which would have kept the lid from sliding off the vessel. Many of the lid sherds are too eroded to obtain an exact measurement of the ledges; however, 1 lid sherd from Nehalem

Bay provided a ledge measurement of 6.5 mm, approximately fitting the groove measurement of the lidded cups and, therefore, the lidded vessels as well. Although it is not 100% certain that the 13 lid sherds originated from the lids meant for the lidded cup and lidded vessels, the approximate size and motif suggests that it is highly likely. In fact, the lid sherds, when compared side by side with the lidded-cup and lidded-vessel sherds, have nearly identical floral-scroll motifs. Some lid sherds match up so well with the cup body sherds, that there is a striking similarity between the accuracy of the washes and detail and color of the outline. While similarities between the lid, lidded-vessel, and lidded-cups sherds suggest that they were from similar vessels, the sherds were not found in equal distribution between locations (Figure 7).

Among the other identifiable vessel forms was the *compressed globular box* and *compressed globular box lid*, all of which were found at Nehalem Bay. Judging from the sherds, the compressed globular boxes are a few centimeters in diameter at the most. The sherds are monochrome white and have no decoration other than a single molded ring on the lids. Four out of the 10 compressed globular box sherds, and 8 compressed globular box lid sherds have unglazed interiors. Both body and lid lack glaze on the rims. Only one radial base measurement was obtained from the boxes, measuring approximately 1.7 cm in diameter.

Boxes similar in shape and size have been noted among the *San Diego* (1600), *Hatcher Junk* (1643), *Ca Mau* (1723-1735) as well as the *Tek Sing* (1822) shipwreck cargos, with both underglaze-blue decoration and molded monochrome styles (Sheaf & Kilburn, 1988). However, the monochrome compressed globular boxes of the Dubé Collection have unique features that are associated with the late-17<sup>th</sup> century (Donnelly, 1967). The uncrackled glaze (Donnelly) and molded decoration are thought to be from the Dehua kilns (Kwok, 2002). Two of the compressed globular box sherds have unglazed bases, which are colored slightly from exposure to kiln heat and curdled. Donnelly noted that the curdled appearance on the bases of small globular boxes was unique to the Dehua kilns and, therefore, this evidence strongly indicates that the globular boxes of the Dubé Collection were made in Dehua as well.

A total of 8 sherds were determined to be from plates or dishes. Since the distinction between bowls, plates, and cups is not clearly defined in Chinese porcelain (Mudge, 1986), identification of specifics when working with a sherd collection is difficult at best. However, there are two features that allowed plates to be identified among the rest of the population. First, a motif specific to *kraak* porcelain export plates assisted in identifying 2 of sherds. The second method in determining plates or dishes among the Dubé Collection was by rim morphology. A total of 6 *klapmutsen*-style, or wide flat rim sherds, were identified indicating that they were from either a bowl or plate, depending on the definition applied (Fischell, 1987, van der Pijl-Ketel, 1982). These are attributed mostly to the Transitional period (Fischell), but have been observed on earlier shipwrecks as well (van der Pijl-Ketel).

A single sherd, NH365, was identified as most likely a vase or bottle. It is a monochrome-white porcelain rim sherd, on the interior of which the potter's finger print is still visible where the mouth of the vessel was formed. The glaze on this sherd is an eroded white-



toned glaze. The sherd has a rather tight curvature which provided an indication that the vase neck was rather small.

Four sherds among the monochrome molded groups are unique in that they represent a variety of more unusual vessel types. Sherds NH373 and NH387, both from Oswald West State Park, appear to be the corner of a multisided vessel of some sort. Sherd NH386 is similar to them, but bears a striking resemblance to the Marco Polo Censure pictured by Donnelly (1967) in both shape and decorative motif—the motif being nearly identical (see Figure 9). Donnelly dated a similar Marco Polo Censure vessel between 1675 and 1725. NH388 is a molded figurative sherd depicting a human European face with a protrusion from the back of the sherd indicating that it may have been applied to the side of a vessel, or otherwise attached to a larger piece. Features of the face do not appear to have Asian qualities, but rather appeared very European in nature, as does the hair style. In addition, molded Sherd NH657 is possibly a petal from the base of a figure such as a Quan Yin figure (Donnelly; Woodward, 1986).



**Figure 9: Marco Polo Censure sherd, NH386, from Oswald West State Park. Low relief motif was created by the molding process.**

In summary, vessel form and vessel type determination for the Dubé Collection gave strong indications of dates as well as kiln origin for a few of the sherds. Most interesting among the vessel types is the compressed globular box, the style of which is thought to be associated with the late-17<sup>th</sup> century and the Dehua kilns (Donnelly, 1967). Lidded cups similar to those identified in the Dubé Collection were observed among the *Vung Tau* cargo (1690) (Jorg & Flecker, 2001). A few sherds indicate manufacture at the Dehua kilns between 1675 and 1725 (Donnelly; Gordon, 1977), including the Marco Polo Censure sherd and the lotus-petal base sherd, likely from a figure. *Klapmutsen*-style plates, or plates with wide flat rims, were also identified, being associated with the time period beginning in the early 17<sup>th</sup> century (Sheaf & Kilburn, 1988), specifically, 1620 and continuing through 1680 (Fischell, 1987); however, the presence of *klapmutsen*-style pieces among the *Witte Leeuw* cargo of 1613 has been well documented (van der Pijl-Ketel, 1982). Finally, *kraak* motifs were used to identify plates or dishes. These motifs are associated with the mid-16<sup>th</sup> century to about 1650 (Mudge, 1986), although similar motifs have been observed among the *Ca Mau* cargo (1723-1735) (Chiến, 2002).

## MARKS

The Dubé Collection contains 19 sherds with marks, 8 of which were translatable or were identifiable symbols. Two sherds in the Dubé Collection clearly have symbols in place of marks. NH400, found at Oswald West State Park, has a fully intact *Artemisia* leaf mark, and NH510, found at Nehalem Bay, has a partial swastika mark, both of which were auspicious symbols of good fortune used during the Kangxi reign in place of the *nien-hao*, or reign mark (Macintosh, 1977, Mudge, 1986). Two other sherds, NH568 and NH517, found at Nehalem Bay, only provided fragmentary evidence of a mark; however, it is possible that they, too, were swastika marks.

The Dubé Collection contains 6 sherds with Chinese character marks, photographs of which were submitted for translation to Dr. P. Wang of Central Washington University. Based on Dr. Wang's translations, most are likely to be hallmarks. Sherd NH463 from Oswald West State Park is the only complete four-character mark. The four-character mark read, "*Juyou Tang zhi*," or "Made by Juyou Company" (P. Wang, personal communication, April, 17, 2008).

The remaining sherds provided partial marks which were often difficult to read due to the breakage and eroded condition of the sherds. However, despite that, Dr. Wang was able to provide several partial translations and possible interpretations. Sherd NH020 has two visible characters translating to "*de*" (virtue), and "*ai*" (love). Only one character from Sherd NH399 was translated to what was possibly "*cheng*" or "accomplish," and NH022 has a single character, partial mark that was translated as "*zhi*," "to make," or "made by" (P. Wang, personal communication, April, 17, 2008).

The breakage and erosion of Sherd NH482 left only three characters of the original mark. According to Dr. Wang the mark reads "*zhi me yu*," or "of (the) beautiful jade" (P. Wang, personal communication, April 17, 2008). This translation was of particular interest in that a

similar mark, which translated “Beautiful Vessel of the Jade Hall,” was observed on the shipwreck *San Agustin* that sank in 1595 (Mudge, 1986, p. 233), and had also been observed on some Ming dynasty porcelain (Butler & Curtis, 2002, p. 108). However, the mark *Beautiful Vessel of the Jade Hall* was particularly fashionable during the Shunzhi reign (Curtis, 1995; Curtis, 2002, p. 42) as it was a reference to an elite bureau of scholars from the Hanlin Academy who held very high degrees (Curtis, 2002). Because of the increased importance on civil service exams that occurred during the Shunzhi reign, references to scholarly achievement, such as the Hanlin Academy, were of particular popularity (Curtis, 2002). Variations of this were often seen as well—one example provided by Butler & Curtis (2002) which read “Made for the Hall of Collecting Jades,” and another on which the characters are in reverse order (Butler & Curtis, Figure 84). Marks referring to the Jade Hall were out of fashion and rarely used during the Kangxi reign (Butler & Curtis, p. 108).

Sherd NH432 has only part of a single Chinese character remaining, and is the only mark that could be either a reign mark or a hallmark. According to Dr. Wang, this sherd has two possible interpretations. The character is likely “*Qing*,” which could be translated two ways: (a) clear or (b) Qing, referring to the Qing dynasty (P. Wang, personal communication, April 17, 2008).

Marks in the Dubé Collection, being either hallmarks or symbol marks, strongly suggest a Transitional period (1620-1683) date or Kangxi reign (1662-1722) date. Hallmarks were frequently used in both of these periods, the Jade Hall mark being of extreme popularity in the Transitional period reign of Shunzhi (1644-1661) (Butler, 2002, p. 108; Curtis, 1995; Curtis, 2002, p. 42). The *Artemisia* leaf and the swastika were both symbol marks known to be used with frequency during the Kangxi (1662-1722) (Macintosh, 1977; Mudge, 1986) as were various other hallmarks since the emperor’s *nien-hao* was banned from use on porcelain in 1677. If indeed NH432 is a reference to the Qing dynasty (1644-1911), it could refer to either the Shunzhi reign or the Kangxi reign.

## DECORATION ATTRIBUTES

Blue underglaze is by far the most common primary decoration type in the Dubé Collection, making up nearly 74% of the collection, followed by monochrome-white porcelain, which accounts for 23% of the collection. This is followed by smaller numbers of blue underglaze with red overglaze, and red overglaze (see Table 6).

Blue underglaze was the only decorative style that was found in all five locations, and is the most common primary decoration type for both Oswald West State Park and Nehalem Bay sherds. Of a total of 878 underglaze-blue sherds, 56% were found at Oswald West State Park and 44% at Nehalem Bay. Monochrome-white sherds, however, were not so equally distributed, and were concentrated in far greater numbers at Oswald West State Park. Nehalem Bay only produced 9% of monochrome population, while Oswald West State Park produced 91% of the monochrome population.

**Table 6: Primary Decoration Type by Provenience**

| Primary decoration                 | Nehalem Bay | Nehalem Falls | Oswald West State Park | Tillamook Bay | Tillamook Head | Total sherds |
|------------------------------------|-------------|---------------|------------------------|---------------|----------------|--------------|
| Blue underglaze                    | 382         | 1             | 492                    | 1             | 2              | 878          |
| Blue underglaze with red overglaze | 4           |               |                        |               |                | 4            |
| Monochrome                         | 29          |               | 277                    |               |                | 306          |
| Red overglaze                      |             |               | 1                      |               |                | 1            |

*Note.* Data represent the number of sherds recovered from each location for which primary decoration type classification was possible.

There is a variation on underglaze-blue decoration that was given a primary decoration category of its own: blue underglaze with red overglaze. Although submersion in water has removed much of the red overglaze, evidence of its presence is still visible. The poor preservation of the red overglaze is highly indicative that it was an iron-based overglaze, which had made its first appearance at Jingdezhen kilns in the 1300s (Kerr, 1986), and was noted for being thinner than other overglazes—as a result, it commonly wore off (Kerr). Overglaze iron-red highly contrasted the copper-red used as underglaze, which as a result of being under the glaze, did not wear off as easily (Mudge, 1986).

A total of 4 blue-underglaze with red-overglaze sherds were found at Nehalem Bay. NH533 is a lot of 2 sherds with similar overglaze application. Both sherds display simple, close together, hash-marked lines of red overglaze characteristic of a floral motif. The only underglaze blue visible on the sherds is concentric double-blue lines that may have been a border pattern. Sherds NH544 and NH603 both have red-overglaze remnants of a floral motif and double underglaze-blue concentric lines—NH544 is slightly stained from deposition. Sherd NH603 is the best preserved in regard to red overglaze. Distinct petals can be made out and there is a light-reddish color indicating where the red overglaze was applied. The stems of the floral blossoms, interestingly, are not worn off and bright red overglaze can be seen.

A single sherd found at Oswald West State Park has exclusively red-overglaze decoration. NH025, a base sherd, has a single iron-red toned line that delineated the body of the vessel from the footrim. Because there is no other decoration visible on the sherd, it is impossible to know for sure if NH025 was from a vessel that had blue underglaze as well, or perhaps some other combination of enameled colors.

As mentioned earlier, red overglaze was used for quite a long time in Chinese porcelain, first appearing in the 14<sup>th</sup> century at the Jingdezhen kilns (Kerr, 1986). Used in a number of polychrome combinations throughout porcelain production, it is particularly associated with

*Imari* porcelain, which was a combination of underglaze blue, overglaze iron-red and, at times, gilt (Mudge, 1986, p. 246). *Imari*, named after the port from which it shipped, was first produced in Japan and it became highly popular during the periods of decreased export from China (Mudge), roughly during the period 1602-1682 (Rawski, 2002). From about 1660 to 1680 (Harrison, 1995; Mudge), Chinese exports increased and, in an attempt to regain a position in foreign markets, the Chinese potters began to imitate Japanese *Imari*, creating their own style, known as *Chinese Imari*, which remained popular from the late-1600s to the mid-1700s (Mudge, p. 246). However, it was not possible to identify the Dubé Collection red-overglaze sherds as true *Imari* porcelain. At times, these colors were used with other polychrome enamels.

Only 1% of the blue-underglaze sherds display secondary decoration (see Table 7). Sherd NH573, found at Nehalem Bay, and Sherd NH660 found at Tillamook Head, both display a subtle molded decoration. In the case of Sherds NH573 and NH660, the molding gives the impression of a slight bulge or almost a flower petal curvature and shape. Sherd NH602, another Nehalem Bay sherd, is the only example of an underglaze-blue floral motif in combination with ribbing.

Two sherds were identified as having both underglaze-blue decoration and brown slip. NH532 is a rather small rim sherd found at Nehalem Bay. Despite the small size of this sherd, it was possible, due to the morphology of the rim, to determine that the brown slip was applied to the exterior. The interior of the sherd displays two concentric blue lines as a rim border pattern. Sherd NH359, the larger of the two sherds, was found at Oswald West State Park. The curvature of this body sherd indicates that the brown slip was applied to the exterior of the vessel, while the interior is decorated in underglaze-blue motifs of concentric blue lines and what is likely a *lingzhu* fungus scroll.

**Table 7: Secondary Decoration Identified on Blue-Underglaze Sherds**

| Secondary decoration types | Nehalem Bay | Nehalem Falls | Oswald West State Park | Tillamook Bay | Tillamook Head | Total sherds |
|----------------------------|-------------|---------------|------------------------|---------------|----------------|--------------|
| Brown slip                 | 1           |               | 1                      |               |                | 2            |
| Molded                     | 1           |               |                        |               | 1              | 2            |
| Ribbed                     | 1           |               |                        |               |                | 1            |
| No secondary decoration    | 379         | 1             | 491                    | 1             | 1              | 873          |

*Note.* Data represent the number of blue-underglaze sherds recovered from each location.

Brown slip exterior and underglaze-blue interior sherds are indicative of a particular type of ware called Batavian porcelain (Donnelly, 1967; Fuchus & Howard, 2005; Mudge, 1986; Sheaf & Kilburn, 1988). Deriving its name from their popularity in the Dutch trading center,

Batavia, this porcelain was made in the late-17th and early 18<sup>th</sup> century, a time coinciding with the Kangxi reign. It was among the cargo of the *Ca Mau* (1723-1735) (Chiên, 2002), which indicated that it was produced through the later period of the Kangxi reign as well (Sheaf & Kilburn). Batavian porcelain had a wide range of brown slips, referred to by names associated with their general tone such as “coffee,” “*café au lait*,” or “tea dust” (Fuchus & Howard; Mudge, p. 153).

Dubé Collection monochrome sherds display a much higher frequency of secondary decoration features than do the underglaze-blue sherds (see Table 8). It is interesting to note that the great majority of the monochrome porcelain population was concentrated at Oswald West State Park, which yielded 91% of all monochromatic sherds in the Dubé Collection. Oswald West State Park was the only location from which ribbed porcelain was recovered. Ribbing is by far the most common secondary decoration among the monochrome sherds. An example can be seen in Figure 5, the grooved-footrim sherd from Oswald West State Park. Vessels with similar ribbed decoration are seen in Donnelly’s (1967) examples of wine cups and Rhinoceros Horn Cups made at Dehua kilns, for which he provided a date range of 1650-1750.

**Table 8: Secondary Decoration Identified on Monochrome Sherds**

| Secondary decoration types | Nehalem Bay | Nehalem Falls | Oswald West State Park | Tillamook Bay | Tillamook Head | Total sherds |
|----------------------------|-------------|---------------|------------------------|---------------|----------------|--------------|
| Incised                    | 4           |               | 9                      |               |                | 13           |
| Molded                     | 1           |               | 11                     |               |                | 12           |
| Ribbed                     |             |               | 75                     |               |                | 75           |
| No secondary decoration    | 24          |               | 182                    |               |                | 206          |

*Note.* Data represent the number of monochrome-white sherds recovered from each location.

Thirteen monochrome sherds have incised motifs. There are two motifs among the incised sherds. Ten sherds have a floral pattern of a narrow leafed plant with rather long stems, and 3 sherds have faint *Prunus* plant decoration that lack definition, almost as if the motif had been incised with a dull instrument.

There are 12 monochrome sherds that fit into the molded category. These sherds are some of the most unique sherds in the collection, and while there are some similarities among the sherds, most are best discussed individually and are explored further in the motif section of this study. Figure 8, the Marco Polo censure sherd, is an example of a molded porcelain vessel, the decorative motif being created in rather low relief from the molding process. Unlike wheel thrown pottery, molded decoration allowed for many exact replicas to be made over many years (Donnelly, 1967). Molded decorations were often figures, floral motifs, or any other variety on

theme. It could have also included decoration carved into the mold itself, which produced a low-relief image, or applied decoration, molded separately from the body of the vessel and applied to the vessel later by hand, giving a high-relief decoration (Donnelly).

Overall, the decorative types in the Dubé Collection suggest a date range of mid-17<sup>th</sup> century to mid-18<sup>th</sup> century. The presence of red overglaze in combination with blue underglaze, typically associated with an *Imari* motif, could not be identified with certainty, nor could a date be determined beyond the start date for iron-red overglaze, roughly 1300 onward. It is worth noting that red overglaze was imported to Mexico in quantity during the late 1600s (Mudge, 1986), regardless of whether the ware was *Imari* or not. Donnelly's (1967) examples of monochrome-white porcelain were very similar to sherds among the Dubé Collection ribbed ware, and were attributed to the 1650 to 1750. However, the presence of Batavian ware in the Dubé Collection provides the strongest dates, having been produced only during the Kangxi, specifically the late-17<sup>th</sup> century to the early 18<sup>th</sup> century (Donnelly; Fuchus & Howard, 2005; Mudge; Sheaf & Kilburn, 1988).

## IDENTIFICATION OF MOTIF ATTRIBUTES

It was possible to identify motifs and general motif themes on 317 sherds, 27% of the Dubé Collection. There were no significant differences between the Oswald West State Park population and the Nehalem Bay population—themes were consistently represented in both locations. Furthermore, despite fewer sherds in the Nehalem Bay population, percentages of each theme were highly consistent with that of Oswald West State Park.

## FLORAL

Floral themes are among the most commonly found motif and account for 11% of the collection. Out of the 133 sherds identified as having floral motif, 117 have no secondary decoration, 10 are incised white monochrome, 4 are molded white monochrome, 1 is a blue-underglaze with red-overglaze sherd, and 1 is an underglaze-blue sherd with ribbing.

## PRUNUS PLANT MOTIFS

A total of 20 *Prunus* blossom or *Prunus* plant motifs were identified among the Dubé Collection sherds, 11 from Nehalem Bay and the remainder from Oswald West State Park. Blue-underglaze sherds account for the majority identified as having *Prunus* blossom motifs, the style and execution of which are generally similar. Sherd NH524, decorated with a *Prunus* branch and several buds, displays a great use of white space and, in addition, has brown dressing applied to the rim. Frank (1969) noted that use of large white areas in composing decorative motifs was a distinctly Transitional period attribute, and was observed among the *Hatcher Junk* cargo of 1643 as well (Sheaf & Kilburn, 1988). In contrast to Sherd NH524, NH469 is very busy in its decorative composition and left with very little open white space on the sherd. The cobalt used is a rather dark, intense blue. Other sherds display full blossoms and branches, while others, just flower buds. These sherds represent just a few of the interesting variations among the *Prunus* plant motifs.

The *Prunus* blossom motif has been used for centuries in Chinese porcelain production and was used in the Ming dynasty as well as through the Transitional period and into the Kangxi reign (Beals & Steele, 1981). Its long use as a motif stems from its important meanings and ties to Daoism, standing for leadership and prosperity (van der Pijl-Ketel, 1982). Commonly, the *Prunus* plant was depicted as part of the *Three Friends of Winter*—three plants—bamboo, pine, and plum that together symbolize longevity (Macintosh, 1977, p. 22). The Three Friends of Winter motif was popular in the Ming dynasty during the reigns of Xuande and Jiajing (Frank, 1969), and experienced a revival of popularity in the Shunzhi reign and Kangxi reign, as it symbolized the characteristics of the Chinese scholar—an ideal of extreme importance during the first two Qing dynasty reigns (Butler, et al. 2002, p. 182). Unfortunately, the *Prunus* blossom sherds in the Dubé Collection do not provide enough detail to determine if the blossoms were part of the Three Friends of Winter Motif.

Regardless, *Prunus* blossoms, even when not associated with the Three Friends of Winter motif saw a peak in popularity during the Kangxi reign (1622-1722) with the production of Hawthorn Jars, which were generally decorated with *Prunus* blossoms depicted in white on a blue cracked-ice background (Frank, 1969; Kerr, 1986). Two of the Dubé Collection sherds fit this description, having a distinct reverse white-on-blue, *Prunus* blossom motif. Sherd NH029 found at Nehalem Bay is a culturally modified sherd from a rather thickly potted vessel (see Figure 10). The glaze is fully intact and cobalt painting appears of some quality. A single white *Prunus* blossom is outlined against a strikingly violet-blue background with angular lines drawn in a cracked-ice pattern. The second sherd, NH334 from Oswald West State Park, does not appear to be from as high quality a vessel as the Nehalem Bay sherd; however, it does have the white *Prunus* blossoms against a rather hastily shaded blue background. A few angular marks divide the background and may have been a quick attempt at a cracked-ice look.

Only 4 monochrome sherds are decorated with a *Prunus* blossom motif. These sherds, at first glance, appear very similar to one another; however, upon closer inspection, distinguishing attributes were identified. Sherds NH643 and NH644 from Nehalem Bay, and Sherd NH389 from Oswald West State Park have incised *Prunus* plant motifs that include blossoms as well as stems and leaves. Unlike some of the other incised porcelain of the Dubé Collection, however, these 3 sherds appear to have been only lightly incised. The two Nehalem Bay sherds, NH643 and NH644, appear to have an off white tone, not nearly as brilliant white as some of the other monochrome-white porcelain seen in the collection. However, Sherd NH389, though similar in motif, is more of a brilliant white tone. This difference could either indicate separate kilns of origin as certain kiln sites produced different shades of white (Donnelly, 1967), or simply a different stage of erosion, but it did not appear to be the result of depositional staining.





**Figure 10: Culturally modified sherd, NH029, from Nehalem Bay displaying a reverse white-on-blue, *Prunus* blossom motif with a cracked-ice background. This motif was typical of the Kangxi reign Hawthorn Jars.**

Sherd NH392, from Oswald West State Park is the only one of its kind identified among the Dubé Collection, having a rather high relief, most likely a molded then applied *Prunus* plant motif—a single full blossom, stem, and leaves. The body of the sherd is bright white to bluish in tone, the glaze, white, pearly, and closely adhered to the biscuit. Nearly identical examples were presented by Donnelly (1967). He provided several examples of similar motifs used on Dehua monochrome or *Blanc de Chine* teacups, vases, and jars. The teacups bore the most striking resemblance to Sherd NH392, both in motif and morphology, as the sherd suggested it would be a rather small open-form vessel with a slightly everted rim. The teacups Donnelly dated from 1675 to 1725.

This date range for the Dubé Collection Sherd NH392 was further confirmed by a chronology of applied *Prunus* blossom motif provided by Donnelly (1967). He noted that post 1725, the *Prunus* blossom had more rounded short petals, and the center was surrounded by tiny beads and several radiating lines. Prior to 1725, *Prunus* blossoms had a rather plain dot for a center, surrounded by petals that either had one or two veins radiating the length of the petal. Sherd NH392 has a plain-centered flower with rather long petals, and a single vein running the length of the petal. This feature, Donnelly dated from 1675 to 1725.

Mudge (1986) also provided an example very similar to Sherd NH392. Dating from 1690 to 1710, she provided a single Dehua, or *Blanc de Chine*, teacup with applied *Prunus* blossom motifs and Mexican silverwork embellishments. In discussion of *Blanc de Chine*, Mudge noted that similar sherds had been found in Mexico City, and its presence there was of no surprise as Mexican import placed high value on *Blanc de Chine*. Similar vessels and sherds have also been located in excavations of Port Royal, Jamaica which was destroyed by earthquake in June of 1692 (Bass, 2005).

### **BAMBOO AND BROAD LOCUST**

Bamboo is another common element of Chinese porcelain decoration, and as previously mentioned, is one of the three plants in the *Three Friends of Winter* motif, which was popular in the Ming dynasty (Frank, 1969), as well as Shunzhi and Kangxi reigns (Butler & Curtis, 2002, p. 120). Representing peace and longevity (van der Pijl-Ketel, 1982), bamboo's popularity in Chinese Porcelain motifs continued throughout porcelain production and was seen in a number of different styles, from the Three Friends of Winter, to landscapes and other floral motifs (Lunsingh & Scheurleer, 1974, Sheaf & Kilburn, 1988). Bamboo motifs were identifiable on 11 Dubé Collection sherds, 8 from Nehalem Bay, and 3 from Oswald West State Park. The Oswald West State Park sherds are all rather fragmented portions of the motif, showing only the telltale stalk of the bamboo tree, which appears jointed. One of the Oswald West State Park sherds and 4 of the Nehalem Bay sherds are smaller and depict only the leaves of the bamboo plant, identifiable by the narrow, pointed leaf. Sherd NH575 from Nehalem Bay is decorated on one side with bamboo and on the reverse with one of the Auspicious Symbols.

Sherds NH498 and NH497 are rather large in comparison to the other bamboo motif borders. Both from Nehalem Bay, these sherds have brown dressing applied to the rims, and display a large amount of white space in the motif composition. That was, as noted earlier, a classic element of Transitional period decoration (Frank, 1969, van der Pijl-Ketel, 1982). Sherd NH497 has so much open white space, in fact, that despite the sherd being rather large (61.7 mm long); the majority is white, indicating a large amount of white space over the entirety of the original vessel. Both Sherds NH497 and NH498 appear so similar in the manner in which their decoration is painted, it is tempting to suggest that they may be from the same vessel; however, despite clean breaks, no refit was possible. The bamboo on these two sherds appears to have been large bamboo trees, and despite only the tops and leaves being visible, it is possible to surmise that the trees would have taken up most of the vertical height of the vessel.

Sherd NH497 is of particular note in that, in addition to the bamboo motif, there is an insect motif as well, specifically a broad locust, which represents courage and immortality (van der Pijl-Ketel, 1982). The broad locust appears on two additional sherds that do not include bamboo motif. Sherd NH427 from Oswald West State Park is a very small sherd, the entirety of it taken up by the depiction of the locust. Sherd NH500, collected from Nehalem Bay is much larger and appears much like NH497, a sherd with large amounts of white space and some unidentifiable outline and wash. Just the head and antennae of the locust are intact. Although Sherd NH427 and Sherd NH500 have no floral elements, they were included in the floral group as the locust was often associated with floral themes.

### **PEACH, PEONY, AND CAMELLIA FLOWERS**

On only seven occasions were specific identifications made of peach, peony, and camellia flowers. These flowers, like the *Prunus* and bamboo, have specific symbolism and meaning and are more or less traditional elements of Chinese porcelain motif. The peach tree or peach blossom was only identified on one sherd. A large Nehalem Bay sherd, NH501, depicts a single peach blossom surrounded by leaves and sprays of surrounding plants. The peach blossom was used throughout the production of Chinese porcelain, enjoying periods of popularity through the centuries (Frank, 1969; Macintosh, 1977). It was a plant sacred to the Daosits (Frank; Macintosh), representing immortality and marriage (van der Pijl-Ketel, 1982), and its periods of extreme popularity often coincided with the reigns of Daoist emperors such as Jiajing (Frank; Macintosh). It was not restricted to Daoist-oriented time periods; however, and was continued in later periods as well. During the Shunzhi reign and the Transitional period, poems with peach blossom symbolism, written on porcelain or alluded to in motifs, were used to comment on political turmoil of the transition from Ming to Qing dynasties (Bai, 2002).

The peony was a flower identifiable among the sherds by its multitude of petals. It has many symbolic meanings including a wish for wealth (Butler & Curtis, 2002, p. 123), love, spring, feminine beauty, masculinity, and an omen of good fortune (van der Pijl-Ketel, 1982). Although used throughout the production of Chinese porcelain and dating back to the Ming dynasty, the peony flower was the most popular floral motif used in the Qing dynasty (Butler & Curtis, p. 119). The motif became particularly important during the Shunzhi and Kangxi reigns of the Qing dynasty, as the flower was associated with a wish for rank in the civil service of the emperor—an institution associated with scholastics that became highly important during these reigns (Butler & Curtis). Although the motif is fragmented and sketchily drawn, Oswald West State Park Sherd NH215 was identified as a peony flower.

Nehalem Bay Sherd NH568 is unique among the entire collection (see Figure 11). Painted with darker cobalt, the design is more highly compact and intense than other sherds in the collection. Harrison (1995) provided an example of a similar decorative motif that she referred to as an *irregular peony* motif (p. 50, Figure 65a), and dated the vessel between 1680 and 1700. However, the irregular peony motif did not appear to be limited to the time period provided by Harrison. An identical motif was observed among the cargo of the Sadana Island shipwreck near Egypt which sank in 1765 (Bass, 2005). The presence of irregular peony motif



**Figure 11: Sherd NH568 with irregular peony motif similar to porcelain found on the Sadana Island shipwreck near Egypt.**

on the Sadana Island wreck confirms that the motif continued for a significant number of years and was popular in the Middle-Eastern market.

Two other sherds, NH262 from Oswald West State Park and NH609 from Nehalem Bay, are only partial depictions of flowers and, therefore, a positive identification was not possible. However, the 2 sherds appear to have either the peony flower or the camellia flower motif.

The camellia flower was used in the 14<sup>th</sup> century during the Ming dynasty as part of the *Four Seasons* motif, which included camellia, peony, pomegranate, and chrysanthemum. In later periods, this motif was changed and *Prunus* plants took the place of the camellia flower (Lion-Goldschmidt, 1978 p. 35). Seen both in the Four Seasons and on its own, the camellia flower was at times considered of no symbolic significance (Butler & Curtis, 2002), and at others, an

emblem of health and beauty (van der Pijl-Ketel, 1982). Oswald West State Park sherd NH398 was identified as a camellia flower, recognizable by the pronounced stamens of the flower on the interior of what may have been a bowl or plate. Likewise, NH659, the sherd collected from Nehalem Falls of the Nehalem River, is decorated with the camellia flower, and is the best, more precise example among the collection.

### **LAKE TAI ROCK**

The motif of Sherd NH091 from Oswald West State Park was identified as a Lake Tai Rock, also known as a garden rock or *Taihu* (Butler & Curtis, 2002, p. 126). A meditative piece in Chinese gardens, these eroded rocks have been used in Chinese porcelain decorations for centuries, symbolizing durability and longevity (van der Pijl-Ketel, 1982). Popular in the Ming dynasty, the Lake Tai Rock motif has been seen in later periods as well, and was included among the cargos of the Wanli reign wreck of the *Witte Leeuw* (1613) (van der Pijl-Ketel), the Transitional period wreck of the *Hatcher Junk* (1643) (Sheaf & Kilburn, 1988), the Shunzhi reign wreck of the *San Diego* (1660) (Desroches, et al. 1996), the Yongzheng reign wreck of the *Ca Mau* (1723-1735) (Chiến, 2002), the Qianlong reign wreck of the *Geldermalsen* (1752) (Sheaf & Kilburn), as well as others.

### **BANANA LEAVES, CATTAILS AND TREES**

Unknown tree varieties, cattails, and banana leaves were identified on 4 sherds. Sherd NH593 with banana leaves, and Sherds NH534 and NH511 with trees, all came from Nehalem Bay, while Sherd NH422 with a cattail motif was found at Oswald West State Park. These motif elements by themselves are of little to no symbolic importance, and depending on their use and orientation, may have either been a part of a floral theme or landscape. Since there is no overwhelming evidence of landscape themes for these sherds they were included among the floral sherds.

Many of the floral motifs identified in the Dubé Collection were used throughout porcelain production and were common in both the Ming and Qing dynasties (Bai, 2002; Butler & Curtis, 2002; Lion-Goldschmidt, 1978). However, there were a few motifs identified that strongly suggest more specific periods of time. The large use of white space was common in the Transitional period (1620-1683) (Frank, 1969; Sheaf & Kilburn, 1988). *Prunus* decorations such as *Prunus* blossom with cracked ice suggest production during the Kangxi reign (1662-1722) (Frank; Kerr, 1986). In addition, among the *Prunus* motifs were several monochrome sherds which, when compared to examples provided by Donnelly (1967), Mudge (1986), and Bass (2005), appear very similar to those dating 1675-1725, 1690-1710, and 1692 respectively. The peach blossom suggested possible dates during the Jiajing (1522-1566) and Shunzhi reigns (1644-1661), while the peony, appearing in the Dubé Collection as both Chinese style and Middle-Eastern style (Bass, Frank; Kerr), was identified as a traditional motif, and the most popular floral motif used in the Qing dynasty (1644-1911) (Butler & Curtis).

### **FLORAL SCROLL**

Second only to the frequency of floral motifs are those sherds with floral-scroll motifs. Floral scroll differed from floral motifs in that there were fewer attempts at naturalistic accuracy,



flowers becoming more stylized and the design covering the decorated portion of the vessel, with scrolls of leaves and stems connecting the blossoms. The Dubé Collection contains 109 underglaze-blue floral-scroll sherds, which account for 9%. Of those sherds, 77 were found at Oswald West State Park and the remaining 32 at Nehalem Bay.

More than any other motif in the collection, floral scroll displays the least amount of variation. It is noteworthy that nearly 10% of the collection, found in two separate locations, is so similarly decorated. In fact, the sherds are so similar to one another that only 15 sherds could be considered variations of what became considered the *standard floral scroll* of the Dubé Collection (see Figure 12). This standard floral scroll of the Dubé Collection varies, for the most part, only in the quality of the painting, the greatest majority being a medium quality, with few examples of high and low quality painting. Comparative examples of similar floral scrolls were not observed in reference work whose subject was solely Imperial porcelain. Rather, the closest similarities to the Dubé Collection floral-scroll sherds were found among catalogues of shipwreck cargos and references dealing with export porcelain (Jorg & Flecker, 2001; Mudge, 1986; Frank, 1969; Valenstein, 1989). The scroll is most similar to late-17<sup>th</sup> century scrolls (Frank; Valenstein, p. 244) and is highly likely a tiger lily scroll, a scroll unique to Kangxi reign export porcelain (Frank) and often associated with a small four-petal flower (Frank; Valenstein, p. 244).



**Figure 12: Sherd NH493, Dubé Collection lidded cup with standard floral scroll identified as tiger lily motif. Tiger lily motif is seen here with the four-petal flower.**

A total of 7 floral-scroll sherds include the four-petal flower associated with the tiger lily motif, 5 of which were collected from Oswald West State Park and only 2 from Nehalem Bay. The flower has a single, plain dot for a center, and four petals radiating from the center (Figure 12, and Figure 13). The tiger lily motif, or four-petal flower set in scroll, was also seen among the *Vung Tau* (1690) cargo, which had the flower as scroll work surrounding cartouches of peony (Jorg & Flecker, 2001, p. 72, Figure 65). A single tea pot associated with the *Ca Mau* shipwreck cargo (1723-1735) also had a variation of tiger lily decoration (Chiến, 2002, Figure 156). The scroll was painted, not in wash, but with hashed lines. With the exception of the hashed lines, the motif was a stylistic match for some of the sherds among the Dubé Collection, having graceful feathered leaves with scroll-like curls at their ends.



**Figure 13: Sherd NH239, a variation of the tiger lily motif four-petal flower.**

Two of the floral-scroll sherds were identified as being lidded cups, while 3 were identified as being from lidded vessels of an unknown type. The similarity in motif and potting suggests that the 3 lidded-vessel, floral-scroll sherds are also lidded cups. All 5 sherds were

found in Nehalem Bay, Sherd NH493 being a beautiful example, the full side of the cup intact from just above the absent footrim to the rim, it is covered in floral scroll with a four-petal flower in the middle (Figure 12). Similar lidded cups were seen among the *Vung Tau* cargo of 1690 (Jorg & Flecker, 2001).

Oswald West State Park produced the 15 sherds that represent the only variations of the standard floral scroll of the Dubé Collection. It is interesting that all variations came from this location. Six of these sherds are of a violet-gray or dark-cobalt underglaze painting, the scroll itself being more tightly painted with very little white space. Sherds NH033 and NH633 from this group are so similar they were likely from exceptionally similar vessels, both having a small, four-petal flower with rounded petals that do not appear similar to the four-petal flowers mentioned previously.

Another variation from the standard floral scroll observed in the Dubé Collection is a *boneless* floral scroll. Boneless cobalt painting was a technique in which no outline was used, only wash, giving a watercolor affect. This style of porcelain decoration was popular during the Ming dynasty reign of Chenghua, but was also common on Kangxi imitations of Chenghua porcelain (Frank, 1969). Only 2 sherds, NH218 and NH351, display a boneless floral-scroll motif. Another variation of floral scroll was an attempt at a more naturalistic floral scroll. Sherd NH031 has leaves and blossoms that cover most of the sherd, but retains a great deal of natural detail.

The final variation of floral scroll is more subtle than that mentioned above. All 6 sherds are, again, from Oswald West State Park and, as opposed to the standard floral scroll in Figure 12 with slender flowing leaves, the floral scroll in these sherds is more rounded. At times the leaves even appear *blobby*, contrasting more greatly the lines which represented stems. In addition, single dots are placed randomly throughout the scroll where white space allowed (see Figures 14 and 15). The blobbier floral scroll is very similar to an example provided by Butler (2002) of a lidded jar with a “lion and plant design” (p. 18, Figure 3) which dated to 1650-1660 and corresponded to the often overlooked Shunzhi reign of the Qing dynasty. An additional example of the same scroll was provided by Harrisson (1995, p. 45, Figure 58a), dated between 1660 and 1670, corresponding to the end of the Shunzhi and the first years of the Kangxi reign.

Overall, the floral-scroll sherds represented the greatest number of sherds that have the smallest amount of variation in the Dubé Collection. The most common floral scroll was seen in both Nehalem Bay and Oswald West State Park population; however the variations on floral scroll were recovered from Oswald West State Park alone. The standard floral scroll, or tiger lily motif, tends to place possible dates from 1662 to 1722, most examples being dated from 1690, and the late-17<sup>th</sup> to early 18<sup>th</sup> century. Variations of floral scroll indicated earlier dates—the blobby scroll observed on Oswald West State Park sherds being associated with examples dating roughly 1650 to 1670 (Butler, 2002, p. 18, Figure 3; Harrisson, 1995, Figure 58a). Only the boneless motif suggested a Ming dynasty date of 1465-1487, corresponding to the Chenghua reign of the Ming dynasty (Frank, 1969).





**Figure 14: Sherd NH210, example of blobby floral scroll identified among the Dubé Collection sherds.**



**Figure 15: Sherd NH328, an additional example of blobby floral-scroll motif. This sherd shows the use of a single dot used to fill in white space.**

## SCROLL

Scroll motifs are design elements that are similar to that seen on a violin head, resembling a loosely rolled piece of paper. There are a total of 38 scroll sherds in the Dubé Collection, 18 from Nehalem Bay and 20 from Oswald West State Park. All are underglaze-blue sherds, one having additional brown slip applied to the exterior of the sherd. Scroll was, in most instances, difficult to identify. In fact, 34 out of the 38 scroll sherds could not be identified to any particular type of scroll. They were simply noted as nonfloral, having no indication of leaves or blossoms of any kind. At times, scrolls cover the sherd, indicating that they would have covered large portions of the vessel as well, while others are simply restricted to borders, usually around body of the vessel just above the footrim.

Two variations of classic scroll were identified, both from Oswald West State Park. The first sherd, NH189, is a simple classic scroll for which no exact date could be determined; however it does resemble the middle-14<sup>th</sup>-century classic scroll (Lion-Goldschmidt, 1978, p. 40) over other time periods. It was not an exact match, so this similarity remains only an observation and the date cannot be said with any confidence. This same classic scroll is used as a footrim border on Sherd NH140, the larger body motif of the sherd being a *lingzhu* fungus, one of the auspicious symbols. Rim sherd NH104 has a more rounded, cartoonlike scroll—an identical match to the style of scroll seen during the Wanli reign (Lion-Goldschmidt, p. 40) of the Ming dynasty. The final scroll sherd, NH348, is a unique sherd in that it has a very stylized four-petal flower against a stark white background similar to vessels seen in the *Vung Tau* wreck of 1690 (Jorg & Flecker, 2001). The flower seems to be surrounded by lines possibly delineating the cartouche of a larger, more central motif. The lines separate the body of the sherd from the scroll as well, and only a small portion of scroll remains, the rest having been lost to breakage. Although only partial, the scroll greatly resembles the Wanli reign scroll seen on Sherd NH104.

## LANDSCAPES

Only 10 sherds in the Dubé Collection were identified as landscape motifs. These are all blue-underglaze sherds and all were found at Oswald West State Park. Sherds NH020 and NH482 are the more remarkable among the landscape group. These 2 base sherds display a basic landscape scene on the interior of the sherds, hashed lines representing water surrounded by darker outline and wash representing land. Both scenes are surrounded by a concentric double-blue line. What is noteworthy about these sherds is the manner in which they were painted: dark washes, dark cobalt outline, use of contrast, and very little use of shading. This method of landscape painting was observed on vessels in the Transitional period *Hatcher Junk* cargo (1643) (Curtis, 1995; Curtis, 2002, p. 42; Sheaf & Kilburn, 1988), and was typical of the Shunzhi reign in general (Curtis, 2002). According to Curtis (1995), the use of high contrast, and an overall lack of shading, was the prevailing mode of landscape decoration on certain vessels between 1690 and the 1720s.

Sherds NH097, NH142, and NH352 are smaller, depicting far less of the original scene than the above mentioned sherds. However, like them, they are land or water elements of landscape scenes. In these three instances, the sherds appear less contrasting, with more subtle

use of lighter tones of cobalt blue. In the case of Sherds NH097 and NH352, the cobalt has a slight violet tone.

Five sherds in the landscape group depict floral elements of landscape motifs. These were differentiated from regular floral motifs by examining the elements orientation in the overall design. Two of the sherds, NH347 and NH402, were identified as cattails and were otherwise unremarkable. However, Sherds NH148, NH153, and NH311 did provide some clues as to the date of sherds. On these sherds, the design of grass or small plant leaves was created by thin lines of cobalt outline. What is important about them is that they do not show the typical High-Transitional period v-shaped technique in which foliage in landscapes was created by small v-shaped (Mathers et al., 1990) or u-shaped lines (Butler, 2002, p. 21). In fact, the *Hatcher Junk* of 1643 contained no porcelain with the classic v-shaped foliage (Sheaf & Kilburn, 1988). This indicated that the landscape sherds in the Dubé Collection either predate or postdate the High-Transitional period (Mathers et al.).

### **AUSPICIOUS SYMBOLS, THE EIGHT HAPPY OMENS, AND THE EIGHT PRECIOUS OBJECTS**

The Eight Happy Omens and The Eight Precious Objects have been, and still are today, traditional symbols rooted in Buddhism. At times these symbols are referred to collectively or interchangeably as The Eight Emblems (Lion-Goldschmidt, 1978, p. 35; Mudge, 1986). They have been used in Chinese porcelain decoration for centuries, both in the Ming (Lion-Goldschmidt) and Qing dynasties (Mudge), but were a particularly common motif on porcelain of the 1680s to the early 1700s (Curtis, 1995). The term, *auspicious symbol* is used to refer to symbols which were not necessarily among the Eight Precious Objects or Eight Happy Omens, but nonetheless, had important symbolic connotations—wishes of good fortune and prosperity (Mudge).

The Dubé Collection contains 10 sherds that have auspicious symbols, Eight Happy Omens or the Eight Precious Objects as motifs, 6 from Oswald West State Park, 2 from Nehalem Bay, 1 from Tillamook Bay, and 1 from Nehalem Falls. Identification was often difficult and complicated by the fact that no two potters painted the symbols in the same manner (Mudge, 1986). Despite that, 6 sherds were identified as depicting various symbols of the Eight Happy Omens and the Eight Precious Objects. Sherd NH021 from Oswald West State Park is a base sherd, the interior of which is decorated with what is most likely the *vase*, one of the Eight Happy Omens. Two ribbons are seen behind the top of the vase, three small petal-like embellishments surround the top, and the body of the symbol appears rather rounded.

Much like Sherd NH021, NH659, the only sherd collected at Nehalem Falls, appears to be decorated with the *vase*. In this case, the top is broken off, but the round body of the vase can be seen clearly as well as the foot. The typical petal-like embellishments surround the uppermost part of the vase, and the same petal-like embellishments adorn the center as a small medallion. Ribbons curl over the top and flow down from the vase. On the reverse side of this sherd is a beautifully executed outline and wash of the camellia flower, its precision and delicacy indicated that this sherd was from a rather fine porcelain vessel.

Nehalem Bay Sherd NH575 is strikingly similar to Sherd NH659. Like Sherd NH659, NH575 is decorated on one side with one of the Eight Happy Omens or one of the Eight Precious Objects. The motif is fragmented and could not be determined for certain; however, it does appear to resemble the jewel or cash of the Eight Precious Objects, or the conch shell of the Eight Happy Omens that was commonplace on Kangxi reign (1662-1722) porcelain (Mudge, 1986). On the reverse side, the sherd has a delicate rendering of bamboo, the same high quality painting as seen in Sherd NH659.

Another Nehalem Bay sherd, NH636 is very small and the motif is barely recognizable. However, it does appear to be one of the Eight Happy Omens, identifiable by the telltale ribbon that loops behind these symbols and then flows down behind them, and the petal-like embellishments so often seen at the top of the symbols (Mudge, 1986).

The final sherd with Eight Happy Omens motif is Tillamook Bay Sherd NH658. Stylistically this sherd is very different. The outline appears in great detail with a gradation of washes delicately applied. The lower portion of the symbol is all that remains, and it appears rather square, a single ribbon twisting behind the object. Although it cannot be said with absolute certainty, the more square shape coupled with what appears to be an attempt to make it look wrinkled or flowing, could be the *canopy* of the Eight Happy Omens.

The *Artemisia* leaf appears on only 1 sherd, NH400, a base collected from Oswald West State Park. The only cobalt decoration visible is a single outline of an *Artemisia* leaf used in place of a *nien-hao* or hallmark. The *Artemisia* leaf was one of the Eight Precious Objects, but was commonly used in place of the reign mark, or *nien-hao*, on the base of porcelain vessels during the Kangxi reign (Macintosh, 1977; Mudge, 1986). It is likely that this use of symbols and, in some cases hallmarks, occurred after 1677 when the Kangxi reign mark was prohibited from use on porcelain (Mudge).

The auspicious symbol of the lingzhi fungus, symbol of immortality (Mudge, 1986) appears on 4 sherds, all from Oswald West State Park. Used in Chinese porcelain decoration for centuries, this fungus was particularly common on early Kangxi reign porcelain vessels (Harrison, 1995). In the Dubé Collection, it is not seen as a mark, but rather incorporated into the motifs themselves. NH034 is the most unusual of the sherds, having a large lingzhi fungus on the interior. The outline is not filled in wash, but is filled in with concentric and hashed lines—a fill technique seen on some Kangxi reign porcelain (Chiến 2002; Frank, 1696). Mudge noted that this particular depiction of the lingzhi fungus was a stylistic motif used for Kangxi reign symbols (p. 233). Kerr (1986) corroborated this, providing an example of a large Kangxi reign plate marked on the bottom with a lingzhi fungus filled with hashed lines and concentric circles dated from 1710 to 1722 (p. 65, Figure 39).

In contrast, the interior decoration of Sherd NH035 is an outline and wash motif of the lingzhi. Similar examples were provided by Mudge (1986) which she described as being typical of the Kangxi reign portrayal of the fungus. Sherd NH140, mentioned previously for its classic

scroll motif, is also decorated with a lingzhi fungus in meticulously applied outline and wash. The final lingzhi sherd, NH359, has a double-blue line surrounding the top of the lingzhi fungus, which seems to radiate out from what would have been the interior center of the vessel. The sherd is remarkable in that it is only one of two examples of Batavian ware in the Dubé Collection, with brown slip applied to the entirety of the exterior.

For the most part, the presence of the Eight Happy Omens, the Eight Precious Objects, and auspicious symbols are not indicative of date. The Dubé Collection contains at least two symbols indicative of the Kangxi reign (1662-1722)—one being the unique hashed line lingzhi fungus, and the other, the *Artemisia* leaf—coupled with the presence of Batavian ware made only in the late-17<sup>th</sup> to mid-18<sup>th</sup> century (Bass, 2005; Fuchus & Howard, 2005; Mudge, 1986).

### PANELED MOTIFS

Paneled motifs are designs that utilize compartmentalization of the decorated surface. In such motifs, each separate panel is usually decorated with different subject matter, alternating themes, or variations of a similar theme. They were observed on 10 Dubé Collection sherds, 6 from Oswald West State Park, 3 from Nehalem Bay, and 1 from Tillamook Head. Paneled motifs were particularly popular among export porcelain motifs and were often considered indicators of porcelain for the European market (Kerr, 1986, p. 65). They have also been commonly associated with *kraak* porcelain, a specific style of export ware famous for its paneled motifs, coarse body, and sandy base (Mathers et al., 1986; McElney, 2006).

There is general agreement that *kraak* porcelain began being produced and exported mid-16<sup>th</sup> century or 1573, coinciding with the reign of Wanli (Harrisson, 1995; Mudge, 1986). However, there is relatively little agreement on when production ended, or *kraak*'s true definition (Frank, 1969; McElney, 2006; van der Pijl-Ketel, 1982). Some researchers placed an end to *kraak* production around 1640-1650 (Mudge; McElney; Harrisson), while some acknowledge other interpretations that allow for later dates (van der Pijl-Ketel). *Kraak-style* motifs have been seen on later porcelain as well, notably among the *Ca Mau* cargo, which dated between 1723 and 1735 (Chiến, 2002), indicating the continued popularity the design. It cannot be said that every paneled sherd in the Dubé Collection is *kraak* porcelain, or even resembles it. However, there are 2 sherds, NH135 and NH320 that stand out as glaringly *kraak*-like, both from Oswald West State Park. Sherd NH135 is a large, somewhat porous bodied base sherd, lacking cavettos, but a portion of the medallion decoration is well intact (see Figure 16). Using descriptions provided by van der Pijl-Ketel (1982) in the catalogue of the *Witte Leeuw* cargo, the sherd appears to be of a double-lined scalloped medallion or star-shaped medallion. The pattern in the scalloped edges alternate between scales and hashed lines. It has an intact footrim, which is v-shaped and slopes inward, just as the *kraak* porcelain on the *Witte Leeuw* (van der Pijl-Ketel). A key characteristic of *kraak* porcelain is missing; however, and that being the telltale chatter marks, or radiating gouges that are so often observed on bases (Mathers et al., 1990; van der Pijl-Ketel).





**Figure 16: Sherd NH135, one of the *kraak* motif sherds identified among the Dubé Collection, having a scalloped or star-shaped medallion. The scalloped edges alternate between scales and hashed lines.**

Sherd NH320 is quite similar (see Figure 17). It is a smaller sherd allowing less detail to be obtained; however, it does have a small portion of cavetto still intact which allows observation of either paneled pendants or lozenges separating floral panels. The central motif is a simple round medallion with a double-blue line, again using the descriptions provided by van der Pijl-Ketel (1982). Sherd NH320 has a far less intact footrim; however, it is apparent from what remained that the footrim is similar to Sherd NH135, which is somewhat v-shaped and sloping inwards. The one difference is that Sherd NH320 does not appear as porous or coarse as Sherd NH135.



**Figure 17: Sherd NH320, one of the *kraak* motif sherds identified among the Dubé Collection, having a simple round medallion with double-blue lines. The cavetto decorations alternates between floral motifs and pendants or lozenges.**

Van der Pijl-Ketel (1982) provided criteria developed by Dutch museums in an attempt to determine what truly should be considered *kraak* porcelain. When these criteria were applied to Sherds NH135 and NH320, it remained unclear if the sherds represent “true” *kraak* porcelain. The first requirement was that the body be white but porous. While Sherd NH135 is coarse textured, Sherd NH320 is not, but there may be a simple explanation for this. The gritty texture of Sherd NH135 might not be from the composition of the porcelain body, rather due to the breakdown of glaze that exposed bubbles and turned them into tiny pits in which sand became lodged. In fact, when magnified, it was possible to see granules of sand wedged in open pockets left by bubbles in the eroded glaze. The body of Sherd NH320 appears fine and nonporous. It is interesting to note, however, that other sources do not consider a porous body a requirement of *kraak* (Lion-Goldschmidt, 1978, p. 192).

The Dutch museums' criteria called for an underglaze-blue decoration and inward sloping footrims (van der Pijl-Ketel, 1982), both of which Sherds NH135 and NH320 exhibit. In addition, the sherds met the criteria for decoration content, NH135 having a center enclosed by a scalloped medallion, and NH320 having tasseled or beaded panels. However, as mentioned, these sherds are lacking chatter marks. The bases of both sherds are smooth and chatter mark-free. The museums also provided the criteria for glaze, molding of the lip rim, adherence of kiln sand, and thickness of body (van der Pijl-Ketel), all of which, unfortunately, could not be compared to Sherds NH135 and NH320 as they are too incomplete and do not display these features. Thus, due to the incomplete nature of the sherds, the application of the Dutch museums' criteria provided by van der Pijl-Ketel was, at best, inconclusive as to whether or not these sherds should be considered true *kraak* porcelain.

These 2 sherds are very similar to some of the *kraak* ware observed on the *San Diego* (1600) (Desroches et al., 1996) and *Witte Leeuw* wreck (1613) (van der Pijl-Ketel, 1982). The medallion pattern on Sherd NH135 is also among the *kraak* porcelain ware of the *Nuestra Señora de la Concepción* (1638) (Mathers et al., 1990). Exact dates of *kraak* ware motifs, especially when the sherds were fragmented as NH135 and NH320, were difficult to determine; however, the quickly executed manner of decoration on Sherds NH135 and NH320 may be indicative that the vessels represented by these sherds were made during the height of porcelain production, post-1600. After 1600, large orders were placed for *kraak* porcelain, and as a result of increasing demand, quality of painting declined (Harrison, 1995). The evidence regarding the two *kraak*-like sherds, NH135 and NH320, remains inconclusive and will be reexamined when comparison to the Tillamook County Museum sherd collection is explored.

There was 1 other sherd that appears somewhat contemporary with the 2 *kraak*-like sherds. Sherd NH444 is a small, extremely flat sherd with thin rims, showing a paneled motif. Each panel has a rounded top, although the rim itself is not foliated. The panel seems to have a quickly drawn pendant or bead motif typical of *kraak*, but it is quickly drawn with simple dots and horizontal lines, typical of the quickly executed *kraak* motifs of peak production post-1600 (Harrison, 1995). The reverse side of the sherd has a single-blue line around the rim, and again, the line follows a foliated pattern despite the straightness of the rim. The motif is similar to small bowls among the *Neustra Señora de la Concepción* (1638) (Mathers et al., 1990), and the *Hatcher Junk* (1643) (Sheaf & Kilburn, 1988). Likewise, the *Vung Tau* (1690) (Jorg & Flecker, 2001) and the *Ca Mau* (1723-1735) (Chiến, 2002) had paneled bowls with a similar single foliated blue line for border patterns; however, they lacked the pendant bead typical of *kraak* and observed on Sherd NH444.

There are 7 Dubé Collection paneled sherds that do not so closely resemble *kraak* porcelain. These sherds are small, with motifs difficult to determine; however, all seem to be rather carefully executed floral motifs. Sherds NH635 and NH607, both from Nehalem Bay, have a silver-blue tone, typical of *kraak* porcelain and Wanli reign porcelain (Frank, 1969). The others, however, are of brighter violet-blue cobalt. Oswald West State Park sherds, NH103 and NH259, are very similar, having a floral paneled motif with a swiggley divided border on the reverse. Sherd NH341 is also floral; however, the panels appeared highly sketchy. Most unusual



is Nehalem Bay Sherd NH573, the only example of a ribbed sherd with underglaze-blue decoration. The interior seems to have a paneled floral motif while the exterior might be a figurative scene.

The most striking of paneled sherds is the Tillamook Head Sherd NH660, decorated with three figures, one boy and two adults along with floral themes. This sherd has a foliated rim as well, and a delicate floral border on the interior. The 7 non-*kraak*-like paneled sherds appear to resemble the later paneled motifs of the *Vung Tau* (1690) (Jorg & Flecker, 2001), the *Ca Mau* (1723-1735) (Chiến, 2002) and the *Geldermalsen* (1752) (Sheaf & Kilburn, 1988).

The small number of paneled motif sherds is probably the most diverse group among the Dubé Collection displaying features typical of a wide range of dates. While it remains uncertain if Sherds NH135 and NH320 are true *kraak*, they, along with Sherd NH444, resemble *kraak* porcelain produced as early as 1605 (McElney, 2006), but most likely between the 1600s to 1630s (Sheaf & Kilburn, 1988; van der Pijl-Ketel, 1982). However, *Kraak*-style motifs have been seen on later porcelain as well, notably among the *Ca Mau* cargo that dated between 1723 and 1735 (Chiến, 2002). The remaining 7 sherds, however, more closely resemble the continued popularity of paneled motifs seen on the *Vung Tau* (1690) (Jorg & Flecker, 2001), the *Ca Mau* (1723-1735) (Chiến) and the *Geldermalsen* (1752) (Sheaf & Kilburn).

## FIGURES

A total of 9 sherds were identified as having figurative motifs. Four of these sherds require special mention as they likely represent the *hundred boys motif* or the *scholars motif*. While children (boys) were a motif used during the Ming dynasty (Lion-Goldschmidt, 1978), these sherds appear to be of a different style. Instead, they greatly resemble examples of the hundred boys motif and the scholars motif provided by Butler & Curtis (2002, Figure 82 & 83), which depicted boys playing together or playing with objects associated with scholars. These motifs, especially the scholars motif, were of immense importance during the reign of Shunzhi and continuing into the Kangxi reign (Curtis, 2002, p. 50). After years of political turmoil, the civil service exams were once again reopened during the reign of Shunzhi, allowing boys to take the exams in order to gain admission into the Imperial civil service. Porcelain with the scholars motif was a wish for good luck, or a commendation for achievement. The hundred boys motif plays into this civic climate as well—a wish for many sons to bring prosperity to the family (Curtis, 2002, p. 52).

Oswald West State Park Sherds NH022 and NH483, along with Tillamook Head Sherd NH661, all display underglaze-blue outline and wash of a boy. The boy in all 3 sherds is painted wearing white flowing pants and a dark robe. On Sherds NH483 and NH660, the boy's head is shaved bald except for a single tuft on the forehead. The figure on Sherd NH022 is incomplete, showing the boy from just the shoulders down painted against a blue wash background. Mentioned several times in this report, Sherd NH660 has a paneled motif; a boy in one panel and a flower in the next (see Figure 18). Above the panels are two adult figures, one appearing to be male and the other possibly a female judging from the appearance of the hair style. Sherd NH660, with the male and female figures overlooking a boy, is most certainly an example of the hundred boys motif.



**Figure 18: Tillamook Head Sherd NH660, showing what is likely an example of the hundred boys motif. The paneled treatment of the motif is highly indicative of a post-Ming dynasty date.**

Sherds NH022 and NH483 provide other clues as well. They do not appear to be painted in the heavy outline of the Ming dynasty (Lion-Goldschmidt, 1978); rather they are finely outlined in violet or violet-blue cobalt resembling that of the Transitional period at the earliest. Furthermore, Sherd NH483 in particular has a light-green glaze intact, not too heavily applied or obstructing the cobalt, which reinforces the late Transitional or early Kangxi date (1662-1722). Additionally, the use of blue wash background as seen on Sherd NH022 was a technique used during the Kangxi (Frank, 1969).

Sherd NH661, found at Tillamook Head, shows a partial figure, with only half of the face and the shoulder of his robe intact (see Figure 19). What is remarkable about this sherd is that the figure is wearing what Butler and Curtis (2002) refer to as a *mock official's hat*, and this most certainly is indicative of this sherd being of a scholars motif vessel. An excellent example of this was provided by Butler and Curtis (p. 234), the mock official's hat was worn by a boy who pretended to teach the other boys, and is therefore a reference to the civil service exams of which so great an importance was placed during the Shunzhi reign and early Kangxi reign.



**Figure 19: Tillamook Head Sherd NH661, showing what appears to be a scholars motif. The figure depicted on this sherd is wearing a mock official's hat.**

The remaining five sherds are figurative, but not necessarily associated with the hundred boys motif or scholars motifs. Both from Nehalem Bay, Sherds NH599 and NH600, display a three-quarter profile of a face very delicately painted. Sherd NH599, the larger of the two sherds, is possibly a woman's face, a lattice fence showing in the background. Oswald West State Park Sherd NH462 also displays a figure's face in full profile as well as the upper body. The figure appears to be overlooking water or a landscape scene. The texture of the sherd is gritty and, again, this may have been due to the deterioration of the glaze resulting in sand adherence rather than the texture of the porcelain. Sherd NH332, from Oswald West State Park, is much the same in texture and was decorated with a figure; however, the head of the figure is missing because of breakage and only the long darkly washed robes were visible.

The figurative motif sherds appear to be painted in a Transitional period, Shunzhi reign (1644-1661) or Kangxi reign style (1662-1722), with light lines and graceful characters. Figurative scenes were particularly popular during the Transitional period (Frank, 1969; Mathers, 1986), Shunzhi reign (Curtis, 2002), and Kangxi reign (Frank). There were also seen in the Ming (Lion-Goldschmidt, 1978); however, many Ming dynasty characteristics were missing among the Dubé Collection sherds. Overall, the sherds in the figurative group indicate a date of late-Transitional/Shunzhi reign or Kangxi reign.

#### **OTHER MOTIF ATTRIBUTES OF NOTE**

There are some elements of decoration that were not associated with a known or particular motif; however, they did provide clues as to the date of the porcelain. *Blobby dots*, cobalt splotted onto the white background with no outline, were used from 1645-1660, and were also seen on a rim or border pattern in the early Kangxi reign (Butler, 2002; Curtis, 2002, p. 44). Three sherds in the Dubé Collection have blobby dots; NH044 and NH226 from Oswald West State Park and NH608 from Nehalem Bay. All are categorized as body sherds; however, the curvature of Sherd NH608 suggests it may have been a flattened rim.

*Stylized four-petal flowers* were observed among the collections as well. Numbering 3 in total, all came from Oswald West State Park and appeared very similar to one another. Each of the small flowers stands alone in silhouette against the white background (see Figure 20). Each has a small center, outlined in cobalt blue but not filled in, and four outline and wash, diamond-shaped petals, the wash nearly as dark as the outline. All 3 appear on the sherd with a blue line that seems to partition the sherd, or delineate separate spaces for different design elements, much in the same way that cartouches were used in the *Hatcher Junk* (1643) (Sheaf & Kilburn, 1988) and *Vung Tau* (1690) (Jorg & Flecker, 2001) cargos. Sherd NH260 simply shows part of the flower with the single-blue line.

However, Sherds NH486 and NH348 contain other design elements. Sherd NH348 has the four-petal flower surrounded by the partitioning blue line on both sides. Below the flower, this line separates the flower from what appeared to be a scroll, possibly similar to Wanli reign classic scroll. Sherd NH486 is quite similar, the blue line partitioning the sherd, dividing the space between the flower and a rather large lingzhi fungus. The use of silhouette and simple lines makes these sherds quite striking (Figure 20).

Although proper name or general reference to the four-petal flower was not found, its occurrence was observed in several figures and photographs. *Vung Tau* (1690) vases and spice dishes displayed similar four-petal flowers with white centers and slightly foliated petals (Jorg & Flecker, 2001, Figures 12, 24, & 63). On at least one occasion, the flowers were seen painted with no centers, only four diamond-shaped petals (Jorg & Flecker, Figure 65). This variation, four diamond-shaped petals with no centers, was also seen on a cup dated from 1700 to 1725 (Mudge, 1986, p. 130, Figure 193). Harrison (1995) provided a third example of the diamond petal with no center on a kendi, or drinking vessel, spout, which she dated from 1690 to 1700 (p33, Figure 38).





**Figure 20: Sherd NH486, stylized four-petal flower with lingzhi fungus.**

The closest example to the Dubé Collection sherds, however, was provided by Valenstein (1989, p. 224, Figure 217). In this example, a vase was pictured with the four-petal flower with diamond-shaped petals and no center. In addition, a hookah base is pictured in the same example that had the four-petal flower with foliated petals around the rim of the vessel. Most notably, the hookah base had an exact match for the standard floral scroll, or tiger lily floral scroll with a four-petal flower, observed among the Dubé Collection sherds. Valenstein dated both of these vessels as late-17<sup>th</sup> or early 18<sup>th</sup>-century vessels.

In addition to the blobby dots and the stylized four-petal flower, there are 2 other sherds with decorative motifs, namely a crow and a cloud, both of which are too fragmentary to obtain any information regarding date. The blobby dots and the four-petal flower, however, seem to suggest they date to the Shunzhi reign (1644-1661) or early Kangxi reign (1622-1722). Blobby dots being used from 1645-1660 (Curtis, 2002), and the four-petal flower, seen in examples provided by Jorg and Flecker, (2001), Mudge (1986), Harrison (1995), and Valenstein (1989) ranged from about 1690 to 1725.

## BORDER MOTIFS AND RIM DRESSING

Of a total of 164 rim sherds in the Dubé Collection, 23 have a brown dressing applied to the rims to prevent chipping (Honey, 1927) or to disguise areas where the glaze had receded from the rim (Butler, 2002, p. 23). The use of brown-rim dressing began in the Chongzhen reign and was used on polychromatic porcelain made for the Japanese market (Butler, p. 23); however, it did not appear within the Chinese domestic or export market until the 1640s-1660s. It was eventually discontinued in early Kangxi and remained out of fashion until the 18<sup>th</sup> century when it was used again on export wares (Butler, p. 23).

Nine different border motifs were identified on 38 sherds in the Dubé Collection. Several of the border patterns identified have a long history of use in Chinese porcelain, the *juxtaposed lozenge/trellis* border being just such a motif (see Figure 21). Called by many different names, such as the trellis border (Sheaf & Kilburn, 1988) or the diamond border, the juxtaposed lozenge/trellis border has been used as a border motif since the Yuan dynasty (Lion-Goldschmidt, 1978). It experienced a revival during the Jiajing reign of the Ming dynasty as well (Lion-Goldschmidt), and was observed among the cargos of the *San Diego* (1600) (Desroches et al., 1996), *Ca Mau* (1723-1735) (Chiến, 2002), the *Vung Tau* (1690) (Jorg & Flecker, 2001), and the *Tek Sing* (1822) (Freedman, 2000). The Dubé Collection has 10 such sherds, only 2 of which were found at Oswald West State Park and the remainder at Nehalem Bay.



**Figure 21: Wide flat rim sherd, NH571, from Nehalem Bay, an example of juxtaposed lozenge/trellis border.**

While 5 of the juxtaposed lozenge/trellis sherds were clearly identified as such, the remaining 5 were a variation of juxtaposed lozenge/trellis that could have easily been mistaken for a zigzag motif (see Figure 22). However, these sherds appear to have evidence of a lozenge offset by three parallel lines. Lion-Goldschmidt (1978) referred to a similar border as simply a *trellis* pattern. One of the Nehalem Bay sherds, NH530, has the lozenge/trellis motif on one side of the rim sherd and an imbricated triangle border on the reverse. Another Nehalem Bay rim sherd, NH598, has a border pattern only on one side; the juxtaposed lozenge/trellis border shares the space with an unidentified pattern that resembles feathers and cuts across the sherd in a circular fashion.



**Figure 22: Sherd NH535 from Nehalem Bay, variation of juxtaposed lozenge/trellis border, often referred to as a trellis border.**

Seven sherds were identified as having what Lion-Goldschmidt (1978) referred to as *imbricated triangle* pattern (see Figure 23)—2 from Oswald West State Park, with the remaining 5 from Nehalem Bay. Imbricated triangle borders have been used to decorate Chinese porcelain since Yuan dynasty (Lion-Goldschmidt) onward. The cargoes of the *Hatcher Junk* (1643) (Sheaf



& Kilburn, 1988), the *Vung Tau* (1690) (Jorg & Flecker, 2001), the *Ca Mau* (1723-1735) (Chiến, 2002), and the *Geldermalsen* (1752) (Sheaf & Kilburn) all contained porcelain with imbricated triangle borders.

A very old border motif, *key fret*, was identified on 4 sherds, 2 from Nehalem Bay and 2 from Oswald West State Park (see Figure 24). Key fret is one of the oldest and most traditional border patterns in Chinese porcelain, having an origin as old as the Song dynasty (960-1279) (Lion-Goldschmidt, 1978). It has been used continuously throughout Chinese porcelain manufacture as indicated by its presence on numerous museum pieces (Emerson, et al., 2000; Lion-Goldschmidt) and shipwrecks, including the above mentioned *Hatcher Junk* (1643) (Sheaf & Kilburn, 1988) the *Vung Tau* (1690) (Jorg & Flecker, 2001), the *Geldermalsen* (1752) (Sheaf & Kilburn), and the *Tek Sing* (1822) (Freedman, 2000).



**Figure 23: Interior of Nehalem Bay Sherd NH497 with imbricated triangle border motif.**





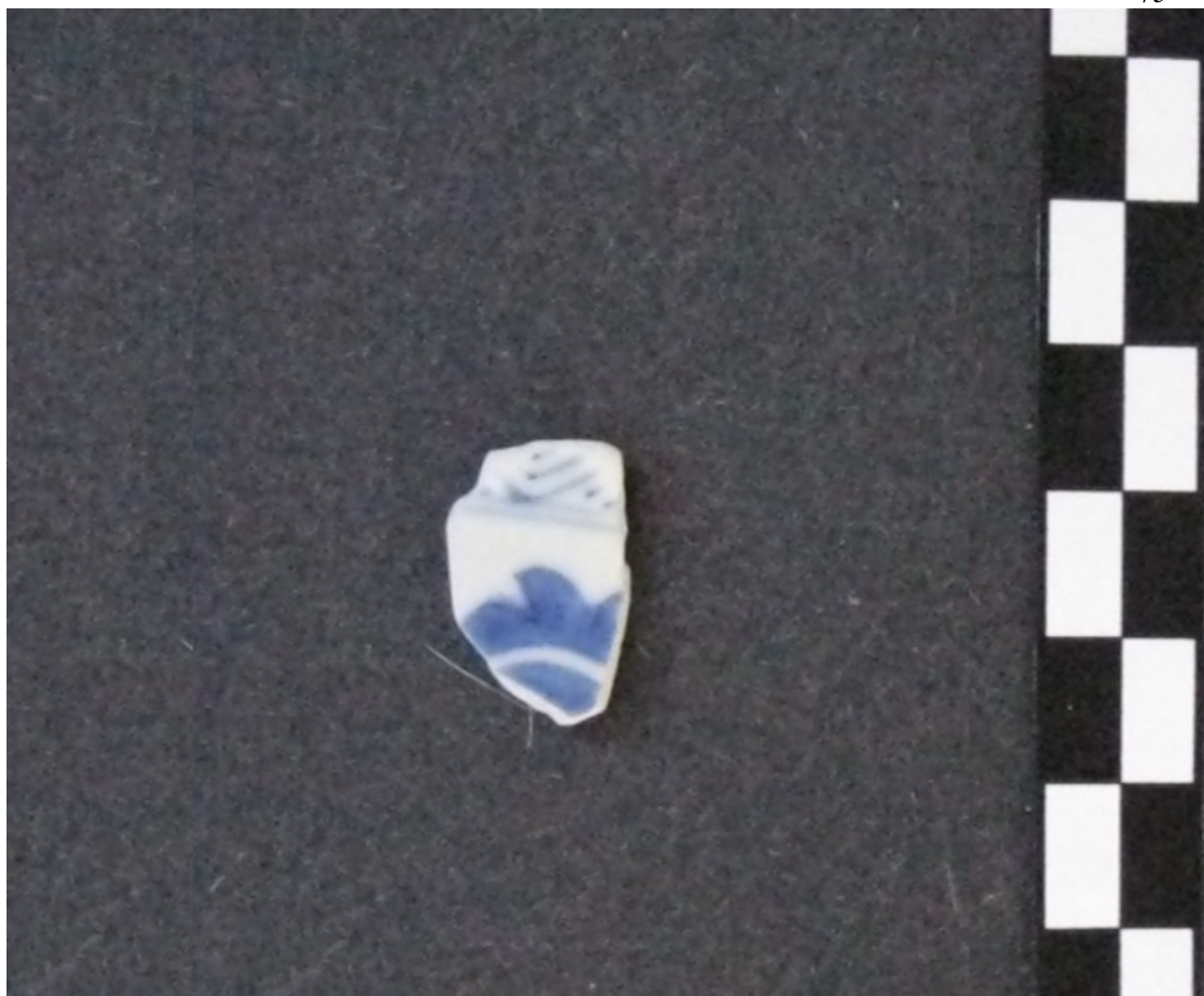
**Figure 24: Nehalem Bay Sherd NH534 with key fret border motif and what is possibly a floral or landscape motif.**

Oswald West State Park Sherd NH233 and Nehalem Bay Sherds NH510, NH516, and NH517 all share a similar border motif as well. Unlike a majority of the sherds discussed in this section, these 4 are base or body sherds, the identifiable border motif appearing around the base just above the footrim (see Figure 25). Many references have referred to this pattern in different ways, the most common being *trefoils* or *deformed trefoils* (Lion-Goldschmidt, 1978). Regardless of its true name, this border has been observed on many Ming dynasty pieces, and according to Butler (2002, p. 23), was one of the borders that was popular from the 1640s and 1650s to approximately 1675, the early Kangxi.



**Figure 25: Nehalem Bay base sherd, NH510, with a trefoil motif around the exterior, delineating the body of the vessel from the footrim. This sherd also displays a swastika mark enclosed in a single-blue line.**

All 3 sherds identified as having *zigzag* border motif were found at Oswald West State Park (see Figure 26). They are very similar in appearance to imbricated triangles; however, instead of the hashed lines forming triangular sections, they run parallel to one another throughout the motif. This, according to Butler (2002, p. 23), was a border pattern of the 1640s or 1650s but was largely out of fashion by 1675, the early Kangxi reign.



**Figure 26: Oswald West State Park Sherd NH186 with a zigzag border motif.**

Butler (2002) also identified the *stonewall* border pattern as dating from the 1640s to 1650s and ending by 1675 (p. 23) (see Figure 27). Sheaf and Kilburn (1988), referring to the same pattern as a *cracked-ice border*, suggested an even narrower time frame, anywhere from 1660 to 1670. A single sherd with this border motif was identified among the Dubé Collection. Oswald West State Park sherd, NH235, is thickly potted and appeared to be either the shoulder or lip of a larger vessel, possibly a vase. Butler and Curtis (2002) provided many examples of the stonewall or cracked-ice border in their work on the Shunzhi reign porcelain, many of the vessels were decorated with figurative or narrative scenes, as well as the hundred boys motif (Butler & Curtis, Figures 64, 68, 70, 77, 72, 83).





**Figure 27: Oswald West State Park Sherd NH235 with stonewall or cracked-ice border motif.**

In summary, identified border motifs represented traditional borders used since the Song and Yuan dynasties in China (Lion-Goldschmidt, 1978). However, a few borders, specifically the stonewall, or cracked-ice border, and the zigzag border indicated dates ranging from the 1640s to approximately 1675, during the early Kangxi reign (Butler, 2002, p. 23). In addition, the presence of brown dressing further supported a date during the Shunzhi reign (1644-1661) or later in the 18<sup>th</sup> century (Butler, p. 23).

#### **THE TILLAMOOK COUNTY PIONEER MUSEUM COLLECTION**

In addition to the detailed Dubé Collection analysis, the Tillamook County Pioneer Museum made available for study 19 Chinese porcelain sherds from among their collections. The records regarding the 19 sherds date back to the 1950s and, at times, were unclear as to the exact origin of the sherds. Records indicated, as did Museum personnel interviewed at the time, that 12 of the sherds were excavated from Site 35-TI-4 (Lise Zimmerman, personal communication,

February 15, 2008). This, in fact, can be confirmed, as the suspected 35-TI-4 sherds in the Museum match sketches provided by Woodward (1986). There is 1 additional sherd that Museum records indicate was found at Cronin's Point in 1986. This may, in fact, be from the excavation of 35-TI-4 as well. Five sherds in the collection were donated after discovery by local citizens over many years; only 1 of these is documented as being found on Nehalem Spit. Finally, a single sherd with a four-character mark was found at the Wilson River village site in northern Tillamook County (Lise Zimmerman, personal communication, February 15, 2008).

Examination of the Tillamook County Pioneer Museum sherds was conducted in the same manner as the sherds in the Dubé Collection, including photographs and measurements. When possible, Museum catalogue numbers were used as identification, and if not present, a temporary number associated with the photographs was used for reference. As it turned out, only 18 of the total 19 sherds in the collection are porcelain, a single arrowpoint from 35-TI-4 actually being quartzite or chert (J. Dubé, personal communication, February 15, 2008). The remaining 18 sherds, however, are all porcelain decorated in underglaze blue, although the degree to which the underglaze is intact varies. Thirteen sherds have clean broken edges, only 1 is moderately eroded, and 4 are culturally modified. The following sherd types were identified: 9 body sherds, 4 base sherds, 1 rim, and 4 porcelain arrowpoints. A total of 6 open-form vessels were identified, 1 of which is a plate or dish.

With the exception of 3 arrowpoints, a thin, green glaze was observed on all of the sherds. In the case of the arrowpoints without glaze, the glaze has been chipped away by the modification of the porcelain into an arrowpoint. As mentioned in the description of the Dubé Collection, green glaze could have been characteristic the Ming dynasty (Frank, 1969; Macintosh, 1977); however, the Tillamook County Pioneer Museum sherds, like the Dubé Collection, are lacking the textural characteristics of Ming dynasty glazes. The Tillamook County Pioneer Museum sherds' glaze more closely resemble that used in the Transitional period (Frank), Shunzhi reign (Curtis, 1995), and the Kangxi reign (Honey, 1927; Kerr, 1986).

Only 2 shades of cobalt were identified, the vast majority being a blue-violet, and only 3 sherds, a violet-gray. Violet cobalt is characteristic of the Transitional period as well as the Kangxi (Frank, 1969), and more gray-toned cobalts of the Hongwu, Zhengde, Wanli, Tianqi reigns of the Ming dynasty and some *kraak* porcelain (Frank).

Floral motifs as well as floral scroll and *kraak* motifs were observed among the Museum collection: 6 sherds with floral motif, 3 with floral scroll, and 1 with a *kraak* motif. Two variations of floral scroll were identified, these being the same two floral scroll variations observed in the Dubé Collection as well. The first floral scroll was identified on 2 sherds, 35ti4N12 and 8692. These sherds display what was termed standard floral scroll, or tiger lily, in the Dubé Collection, graceful flowing scrolls of slender leaves that covered the sherd. A complete base sherd, 8692, has a bright blue scroll with a deep footrim. The footrim has a delicate *bevel* or *undercut* that appears slightly apricot in color, suggesting a lack of glaze and resulting exposure to heat inside the kiln when fired. It is thought that the bevel, or undercut

footrim, was to allow the vessel to be placed upon a wooden stand for display and was a unique feature of the Kangxi reign (Vermeer, 2005).

Sherd 15, from Site 35-TI-4, displays the same blobby floral scroll identified among 6 of the Dubé Collection sherds. Again, this floral scroll is similar to examples provided by Butler et al. (2002, p. 18, Figure 3) and Harrisson (1995, Figure 58a), which dated 1650-1670 collectively, corresponding to the end of the Shunzhi and the first years of the Kangxi reign. Additionally, rim Sherd 86.16 from Cronin's Point is decorated in violet-gray cobalt with a reserve or medallion pattern similar to Nehalem Bay Sherd NH572.

A single sherd in the Tillamook County Pioneer Museum came from the Wilson River site, a village site near Tillamook Bay (Lise Zimmerman, personal communication, February 15, 2008; Sauter & Johnson, 1974). The site consisted of four major sections, two house pit areas, and two midden areas. The site was approximately 5 ft deep at low tide and 120 ft wide. Shells, salmon vertebrae, elk, bear, and deer bones were among the items excavated from the middens. The site also yielded hunting tools as well as evidence of trade such as beads and a coin (Sauter & Johnson). According to Sauter and Johnson a small area of the excavated site gave indications of being a burial ground and from this area of the excavation several types of beads were found as well as pieces of beeswax and two sherds of Chinese porcelain.

The Tillamook County Pioneer Museum has among the collection only a single base sherd, 82.176, from the Wilson River Site, found at a depth of 4 ft—stained, likely from deposition. This sherd was of particular interest in that the base contains a four-character Chinese mark enclosed in two double circles. Dr. P. Wang of Central Washington University translated the mark which read “*guang zhu tang zhi*” or “Made by the Guangzhu Hall” (P. Wang, personal communication, April, 17, 2008).

Found by a local resident after a storm, Sherd 00.122.1/00.122.2, originally 2 sherds that were later refit and glued together, strongly resemble the *kraak*-like sherds among the Dubé Collection. Sherd 00.122.1/00.122.2 represents the largest sherds in both the museum collection and the Dubé Collection, measuring 79.1 mm in length after refit. This sherd is very similar to Oswald West State Park Sherd NH320 and is decorated with typical *kraak* motifs of a floral theme in the center with a rounded medallion enclosed in two concentric blue lines. The cavettos are decorated by panels separated by smaller bands of lozenges and beads. The largest panel of this sherd is decorated with an *Artemisia* leaf.

When the Dutch museums' criteria for the identification of *kraak* porcelain were applied to 00.122.1/00.122.2, it resulted in some interesting finds. First, it was clear that 00.122.1/00.122.2 meets the body criterion, having an orange discoloration to the rim. The body criterion also required the porcelain to be coarse; however, the Tillamook sherd does not appear to be coarse at all. There are a few small inclusions, but they are very few. Second, the glaze criteria were met as well, with 00.122.1/00.122.2 showing evidence of the glaze bursting on the body of the vessel, the areas appearing burned an orange or apricot color. The thickness of the body, molding, and decoration criteria were met, having a relatively thin body and a footrim that

slants inwards, a molded pattern to the vessel wall and, blue underglaze, stereotypical panel design with Buddhist emblems divided by beads and lozenges. The lip rim, however, does not appear foliated.

The footrim is lacking glaze, and appears to have been scraped off as was commonly done to prevent the vessel sticking to the saggars in the kiln (van der Pijl-Ketel, 1982, p. 48). This, however, was the only part of Criteria 5, the potting technique criteria, that was met by the Tillamook County Pioneer Museum sherd. It lacks chatter marks, as do the two Dubé Collection sherds, both on the vessel base and the exterior of the footrim. There is no sign of adhering kiln sand, nor is there enough evidence to indicate warping. Despite this, it is likely that Sherd 00.122.1/00.122.2 would have been considered true *kraak* porcelain by Dutch museums as the majority of criteria were present. This in turn provides a stronger argument for the Dubé Collection Sherds NH135 and NH320 to be considered *kraak* as well. It is unclear if the Tillamook County Pioneer Museum sherds or the Dubé Collection Sherds NH135 and NH320 met the coarse body criteria or not, and it is interesting to note that not all consider this a must for *kraak* (Lion-Goldschmidt, 1978, p. 192).

A date for the Tillamook County Pioneer Museum *kraak* porcelain sherd was difficult to determine. It can be said however, that it appears quickly executed, and therefore, is most likely produced during the height of *kraak* porcelain production, mass production causing a decline in quality post 1600 (Harrisson, 1995). Similar, though not identical, motifs were seen among the cargo of the *San Diego* (1600) (Desroches et al. 1996) and the cargo of the *Witte Leeuw* (1613) (van der Pijl-Ketel, 1982). As previously noted however, the definition of *kraak* porcelain has not set been in stone, and there have been many different interpretations of what should be considered *kraak* (van der Pijl-Ketel). *Kraak*-style motifs have been seen on later porcelain as well, notably among the *Ca Mau* (Chiến, 2002) cargo that dated between 1723 and 1735.

The Tillamook County Pioneer Museum collection of 18 porcelain sherds is remarkably similar to the Dubé Collection. The Museum sherds display green-toned glaze and violet-blue underglaze typical of the Transitional period (1620-1683) and the Kangxi reign (1662-1722) of the Qing dynasty. A few examples of violet-gray underglaze were observed, violet-gray having been common in a number of Ming dynasty reigns such as Hongwu (1368-1398), Zhengde (1506-1521), Wanli (1573-1620), Tianqi (1621-1627), and some *kraak* porcelain (Frank, 1969). However, like the Dubé Collection, the sherds lack the textured appearance of Ming dynasty porcelain glaze (Frank). In addition, the same blobby floral scroll of the Dubé Collection was seen on 1 Tillamook County Pioneer Museum sherd, roughly dating from 1650-1660 (Butler, 2002, p. 18; Harrisson, 1995, Figure 58a). Much like Sherds NH135 and NH320, a single sherd of the Tillamook County Pioneer Museum was identified as being *kraak* could date anywhere from 1600 to the 1640s, during the height of production. The beveled footrim, indicative of Kangxi reign porcelain (Vermeer, 2005), however, was not observed among the Dubé Collection, and this was likely due to erosion of most base sherds.

## OTHER SHERDS

During analysis of the Dubé Collection, a resident of Manzanita was kind enough to allow 2 sherds she had collected from Nehalem Bay to be included. These sherds were not included among percentages and calculations of Dubé Collection sherds discussed previously, but were photographed and measured in the same manner. They were given separate, temporary sherd numbers for reference, NB0001 and NB0002. Both sherds has fully intact green-toned glaze consistent with that found among the Dubé Collection, as well as those at the Tillamook County Pioneer Museum. Both are decorated in underglaze blue which has a blue-violet tone.

Measuring 62.8 mm in length and 2.8 mm in thickness, Sherd NB0001 is rather large with a slightly everted rim. The rim is covered in brown-rim dressing; a simple double-blue line serves as the exterior border pattern, while the interior is decorated with an imbricated triangle border. The body of the sherd is covered in a loose peony scroll. Although a peony was not identified among scroll on the Dubé Collection sherds, scrolls similar to Sherd NB0001 were observed: Sherd NH001, a base sherd from Oswald West State Park, NH493, a lidded cup from Nehalem Bay, and Sherd NH499, an open-form vessel from Nehalem Bay. Sherd NB0001 is very similar to these sherds having the same style of floral scroll and brown rims as in the case of Sherd NH499. In addition, Tillamook County Pioneer Museum Sherd 8662 has a similar, though not identical, scroll.

Sherd NB0002 is the rim portion of a lidded vessel, very similar to a number of those determined to be lidded cups in the Dubé Collection. Sherd NB0002 measures 58.9 mm in length and 2.6 mm in thickness, with a 7.4 mm rim on the interior to accommodate a lid. It is decorated in an underglaze-blue floral-scroll motif similar to several Dubé Collection sherds that were identified as having tiger lily motif, including Oswald West State Park body Sherds NH353, NH452 and NH476. In addition, it was similar to Nehalem Bay body Sherd NH494, although NH494 appears to be of much higher quality decoration.

After examination of the Tillamook County Pioneer Museum sherds and the 2 other sherds supplied by the local resident, it is apparent that they are indeed contemporary with the Dubé Collection, having similar motifs and characteristics. In addition, they were found within the same small geographic area. Therefore, it is likely that these two groups of sherds had the same depositional origin as the Dubé Collection. For this reason, the Tillamook County Pioneer Museum sherds, as well as the 2 sherds provided by the local resident, will be included among discussion and date determination of the Dubé Collection, and these additional 20 sherds will be referred to as members of Dubé Collection population.



## CHAPTER V DISCUSSION AND CONCLUSION

### ANALYSIS AND DATE RANGE DETERMINATION

The Dubé Collection MNV was 249 vessels (see Table 9). As mentioned previously, this was calculated by considering the number of bases found in addition to unique motifs that were not associated with base sherds. The greatest MNV was produced by Oswald West State Park, due in large part to the high frequency of base sherds recovered from that location. In contrast, the Nehalem Bay population only contained a few base sherds. Sherds from Nehalem Bay also tended to be small and highly fragmented, making unique motifs difficult or impossible to identify.

**Table 9: Dubé Collection Minimum Number of Vessels**

| Location                           | Minimum number of vessels |
|------------------------------------|---------------------------|
| Nehalem Bay                        | 35                        |
| Nehalem Falls                      | 1                         |
| Oswald West State Park             | 207                       |
| Tillamook Bay                      | 1                         |
| Tillamook Head                     | 1                         |
| Tillamook County<br>Pioneer Museum | 4                         |
| Total                              | 249                       |

Attributes and porcelain ware types identified among the Dubé Collection tend to suggest a Transitional period (1620-1683), Shunzhi (1644-1661), or Kangxi reign date (1662-1722), with only a few examples, such as the Wanli reign (1573-1620) and 14<sup>th</sup>-century classic scroll indicating an earlier date. In order to determine a narrower date range, analysis of attributes and porcelain types was conducted in the following manner. First, a simple visual interpretation of attributes and porcelain types associated with specific date ranges was conducted. This followed the model provided by South (2002, chap. 7), which he used to determine an occupation period for several archaeological sites, based on the presence and absence of various ceramic types. With the Dubé Collection, no attempt was made to determine an occupation period; however, South's same principles were used to establish a possible date range for the deposition of the ceramics.

Second, a specific set of attributes and types was selected to be included in a determination of the mean ceramic date, again following South's model (2002, chap. 7). This model was designed to examine occupation periods among sites, and unlike the visual interpretation method, took into account the frequency of attributes by using a weighted average. Ware types in South's model were based on known time frames of certain wares among British

American sites and, therefore, his definitions and dates could not be used for this study. Rather, time frames, attributes, and types were adapted for the purposes of this study to reflect Chinese porcelain attribute dates, as well as features observed among the Dubé Collection sherds.

Lastly, the Dubé Collection mean ceramic date and visually interpreted date range were compared to Erlandson et al.'s (2001) refined date range (1620-1650), which was based on radiocarbon dates, historical information, and archaeological data. The results of the Dubé Collection analysis were compared to known historic dates concerning the Chinese porcelain trade, as well as the dates of the two shipwrecks which Williams (2006) suggested are likely to be the source of the porcelain. In addition, the mean ceramic date and visually interpreted date range were considered in context of the Dubé Collection attributes and porcelain types that were not included in the aforementioned calculations, but were used to refine, narrow, or invalidate the dates suggested.

Not all attributes and types identified were suitable for inclusion in the visual interpretation of attributes and mean ceramic date, and were omitted either for a lack of definitive information or for a lack of consensus among existing porcelain literature. More often than not, resources contradicted one another, not only using different date ranges for attributes and types, but also lacking of standardization of terms. Additionally, existing porcelain literature is largely descriptive, each author using his/her own terminology to express what was observed regarding the porcelain. This made interpretation of information provided difficult, even at times rendering the information useless, especially in cases where no photographic examples were given. These inconsistencies and omissions were the greatest reasons that many of the attributes had to be disregarded when it came to determining a date range and mean ceramic date using South's (2002) model. There was simply not enough certainty with some attribute dates and definitions to include them.

Often, existing Chinese porcelain literature referred to dates loosely by nonspecific periods such as "late-17<sup>th</sup> century" or "early 18<sup>th</sup> century." In order to produce a mean ceramic date as well as a visual interpretation of attribute date ranges, more precise dates were needed. Therefore, for the purposes of this study, the most commonly agreed-to attribute date among existing research was used. When porcelain attributes and types were given a date range of "late," "middle," or "early" in the century, they were defined in this study as follows: *early century*—turn of the century through the 30s, *middle century*—40s through the 60s, and *late century*—70s to the end of the century.

A total of 13 dateable attributes and porcelain ware types identified among the Dubé Collection sherds were determined to have enough documentation among resources to be included in determining a date range (see Table 10 for a list of the 13 attributes in addition to references).

**Table 10: Attributes Used for Visual Interpretation of Date Range**

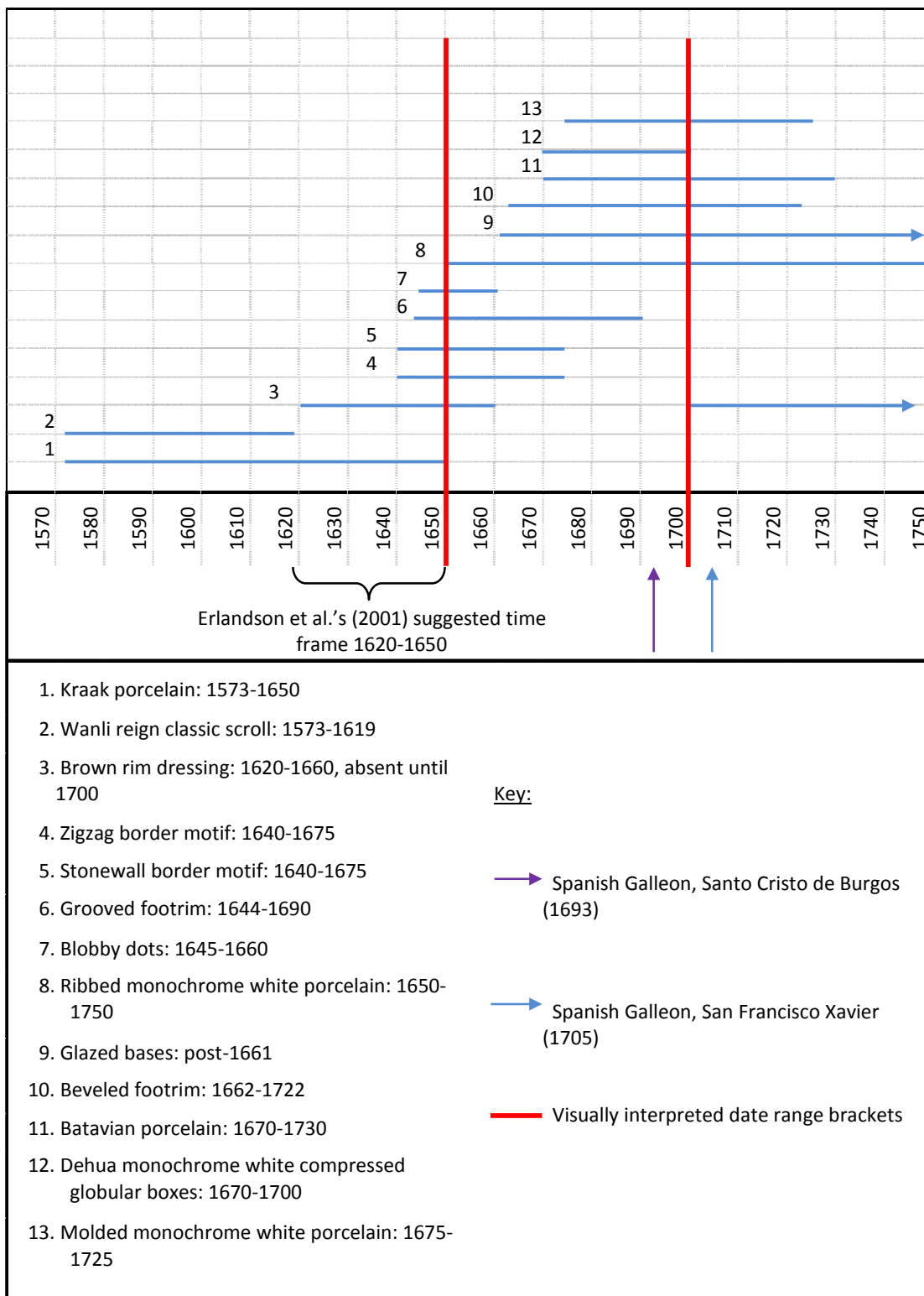
| Attribute  | Attribute date          | Reference  |
|--|-------------------------|--|
| Kraak porcelain                                  | 1573-1650               | Frank (1969), Harrison (1995), McElney (2006), Mudge (1986), van der Pijl-Ketel (1982)               |
| Wanli reign classic scroll                       | 1573-1619               | Lion-Goldschmidt (1978)  |
| Brown-rim dressing                               | 1620-1660,<br>Post-1700 | Butler (2002)  |
| Zigzag border motif                              | 1640-1675               | Butler (2002)  |
| Stonewall border motif                           | 1640-1675               | Butler (2002)  |
| Grooved footrim                                  | 1644-1690               | Butler (2002), Butler & Curtis (2002), Curtis (1995), Donnelly (1967), Harrison (1995), Mudge (1986) |
| Blobby dots                                      | 1645-1660               | Butler (2002)  |
| Ribbed monochrome-white porcelain                | 1650-1750               | Donnelly (1967), Gordon (1977)   |
| Glazed bases                                     | Post-1661               | Butler (2002)  |
| Beveled footrim                                  | 1662-1722               | Vermeer (2005)   |
| Batavian porcelain                               | 1670-1730               | Donnelly (1967), Fuchus & Howard, 2005; Mudge (1986), Sheaf & Kilburn (1988)                         |
| Dehua monochrome-white compressed globular boxes | 1670-1700               | Donnelly (1967), Gordon (1977)   |
| Molded monochrome-white Porcelain                | 1675-1725               | Donnelly (1967), Gordon (1977)   |

The attributes and porcelain ware types were graphed on the timeline in Figure 28. In order to determine the date range of the attributes, South (2002) suggested that at least half of the attributes must coincide with the earliest time period marker. Similarly, at least half must coincide with the latest time period marker; however, the latest period marker must at least touch the beginning of the latest attribute observed. Thus, given 13 attributes and types, it was necessary that over 6 of them corresponded with each date range marker. As shown by Figure 28, this provided a date range for the Dubé Collection between 1650 and 1700, indicated by the solid vertical lines. The later portion of this date range comes close to both shipwrecks that Williams (2006) proposed are likely to be the source of the porcelain, the *Santo Cristo de Burgos* (1693) and the *San Francisco Xavier* (1705); however, this more strongly indicates the *Santo Cristo de Burgos*, as the *San Francisco Xavier* is farther outside the date range. Erlandson et al.'s (2001) suggested time frame (1620-1650), which was partially based on radiocarbon dates averaging AD 1520-1635 (Erlandson et al.), more closely corresponds to the earlier portion of the visually interpreted date range.

Based upon observation, it is apparent that there is a specific group of early attributes—attributes 1 through 7—and a specific group of later attributes, attributes 3, and 8 through 13 (see Figure 29). Treating these as two separate periods, two nonoverlapping date ranges can be determined using the original date range markers as a rough mid-point for the two groups. The blue shaded areas on Figure 29 indicate the two nonoverlapping time periods, which were drawn where the markers would coincide with the greatest number of attributes. The earlier of the two periods ranges between 1645 and 1660, and the later, 1675 to 1700—the date of 1700 being required as the latest attribute's start date.

The earlier period generated, 1645-1660, easily explains the radiocarbon dates (AD 1520-1635) and Erlandson et al.'s (2001) refined time frame (1620-1650), although it should be taken into account that wood from which some of the radiocarbon dates were generated would be expected to predate the actual date of the shipwreck. This is because manufacture of the ship was likely to have occurred years before its deposition on the Oregon Coast. More importantly, wood from which the vessel was built could predate the wreck by decades (or at times centuries) depending on what portion of the tree the wood originally came from, the center of the tree being older than the outer portions. Therefore, the radiocarbon dates' association with the earlier portion of the date range should not be discounted (S. Williams, personal communication, January 3, 2008). The later period more closely corresponds to the earlier of the two shipwrecks proposed by Williams, the *Santo Cristo de Burgos* (1693). Distribution of early and later attributes do not provide any clues as to whether or not the porcelain represents two separate shipwreck cargoes; both early and late attributes appeared more heavily concentrated at Oswald West State Park than Nehalem Bay.

The above method and, therefore, the date range suggested by it, did not take into account the frequency with which the attributes occurred. For example, many of the attributes responsible for the earlier portion of the date range 1650-1700 occurred with relatively lower frequency than did many of the attributes responsible for the later portion of the visually interpreted date range. Therefore, it was also important to examine the attributes in light of which attributes were the most commonly occurring—a weighted average was needed. This was accomplished by way of calculating a mean ceramic date.



**Figure 28: Visually interpreted date range for the Dubé Collection porcelain attributes.**

South's model (2002) for calculating a mean ceramic date utilized the accepted date of specific ware types to determine the date of occupation. His model was adapted for the purposes of this study to suggest a mean value for the possible manufacture or export date range of the ceramics, rather than a date of occupation. Instead of using South's ware types, accepted dates of certain porcelain attributes were used. Much as in the case of the visual interpretation of attributes and generation of a date range, disagreement of attribute dates, as well as ambiguous information in available resources, led to the exclusion of many attributes as exact dates were needed. Again, attributes that could not be included in the mean ceramic date calculation will be discussed in context with the mean ceramic date later.

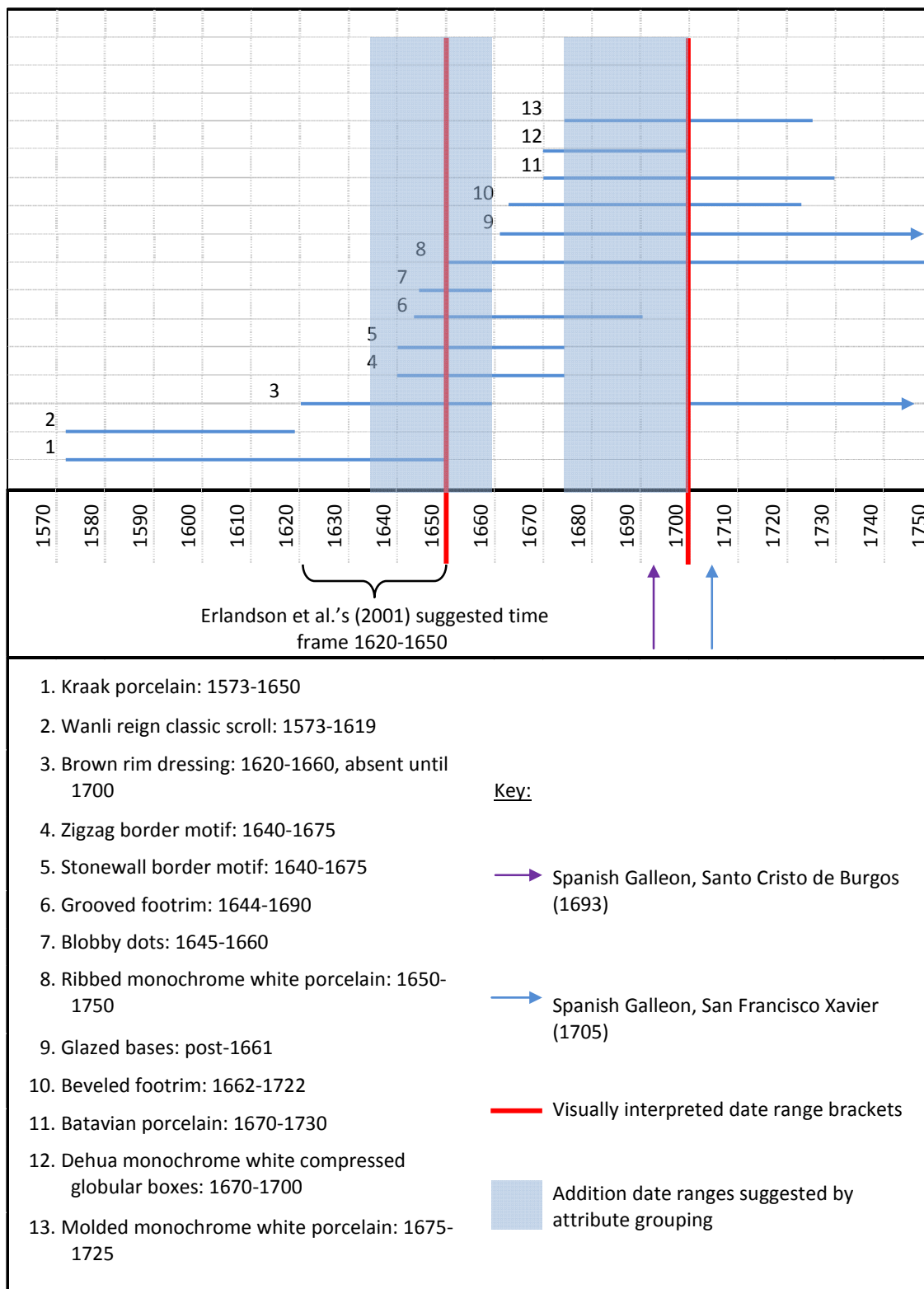
The mean ceramic date was calculated using the following equation (South, 2002, p. 217):

$$Y = \frac{\sum_{i=1}^n X_i \cdot f_i}{\sum_{i=1}^n f_i}$$

where  $n$  = the number of attributes identified,  $X_i$  = the median date for each attribute, and  $f_i$  = the frequency at which it occurred in the collection.

A date range was determined for each attribute, and from each date range a median date was calculated (see Table 11). The median date was multiplied by the number of times the attribute occurred within the collection. The total sum of the frequency column was then divided into the total sum of the product column, resulting in a mean ceramic date. A total of 11 attributes and types were used, resulting in a mean ceramic date of 1686. The mean ceramic date (1686) falls closer to the later portion of the visually interpreted date range (1650-1700), and supports the shipwreck identities proposed by Williams (2006). The indication is that the majority of features identified in the Dubé Collection correspond to the later portion of the date range suggested by the visual interpretation model.

Attributes and types that were not included in the mean ceramic date calculation, or the visually interpreted date range, support the dates generated by the two models. These include *klapmutsen*-style or wide flat rims (1620-1680) (Fischell, 1987), the large areas of white space common during the Transitional period, evidence of Dehua kiln production (1675-1725) (Donnelly, 1967; Gordon, 1977), ribbed monochrome porcelain (1650-1725), and monochrome *Prunus motif* (1675-1725) (Donnelly). In addition, figurative elements of the Shunzhi reign and Kangxi reign (Butler & Curtis, 2002) support the totality of the visually interpreted date range, as do the manner in which some of the landscapes were painted, which Curtis (1995; 2002, p. 42) attributed to the Shunzhi reign or, perhaps, even between 1690 and 1720 when contrasting shades were seen as the primary mode of landscape painting.



**Figure 29: Visually interpreted date range, shaded areas showing two time periods.**

**Table 11: Calculation of Mean Ceramic Date**

| Attribute or porcelain type | Date range | Median date (A) | Frequency (B) | A × B   |
|-----------------------------|------------|-----------------|---------------|---------|
| Beveled Foot                | 1662-1722  | 1692            | 1             | 1,692   |
| Grooved Foot                | 1644-1690  | 1667            | 17            | 28,339  |
| Globular Box                | 1670-1700  | 1670            | 18            | 30,060  |
| Ribbed                      | 1650-1750  | 1700            | 75            | 127,500 |
| Molded Dehua                | 1675-1725  | 1700            | 12            | 20,400  |
| <i>Kraak</i>                | 1573-1650  | 1611.5          | 3             | 4,834.5 |
| Zigzag                      | 1640-1675  | 1657.5          | 3             | 4,972.5 |
| Stonewall                   | 1640-1675  | 1657.5          | 1             | 1,657.5 |
| Wanli scroll                | 1573-1619  | 1596            | 1             | 1,596   |
| Blobby Dots                 | 1645-1660  | 1652.5          | 3             | 4,957.5 |
| Batavian                    | 1670-1730  | 1700            | 2             | 3,400   |
| Total <sup>a</sup>          |            |                 | 136           | 229,409 |

<sup>a</sup> Mean ceramic date calculated by dividing the total of column A × B by the total of the frequency column. Therefore,  $229,409 \div 136 = 1686$ .

Many attributes, however, support dates later or earlier than the dates generated by the two models. There were many attributes and types more closely aligned with the mean ceramic date and later portion of the visually interpreted date range (1650-1700), which would have occurred during the early and middle portion of the Kangxi reign. These include the *Prunus* blossoms with cracked-ice motif popular on Hawthorn jars and other vessels during the Kangxi (Frank, 1969), the Eight Happy Omens and Eight Precious Objects common from 1680 to the early 18<sup>th</sup> century (Curtis, 1995), and the identification of lidded cups also observed among the *Vung Tau* cargo (1690) (Jorg & Flecker, 2001), which likely coincided with the increased popularity of chocolate and coffee drinking post 1690 (Mudge, 1986). Likewise, the repeated use of hallmarks observed among the Dubé Collection was popular during the Kangxi after 1677 (Mudge), especially the *Artemisia* leaf mark, identified on Sherd NH400. Macintosh (1977) stated that the *Artemisia* leaf mark was typical of the early Kangxi reign (1662-1683), as was the lingzhi fungus filled with hashed lines (Kerr, 1986) identified on Sherd NH034. Non-*kraak* panel motifs identified among the Dubé Collection resemble the continued popularity of paneled motifs in European export (Kerr, p. 65), and were observed on the *Vung Tau* (1690) (Jorg & Flecker), *Ca Mau* (1723-1735) (Chiên, 2002), and *Geldermalsen* (1752) (Sheaf & Kilburn, 1988)



cargoes. Also indicative of a Kangxi date was the stylized four-petal flower identified on examples between 1690 and 1725 (Harrison, 1995; Jorg & Flecker; Mudge), as well as a unique scroll associated with a four-petal flower. This scroll, common among the Dubé Collection sherds, was referred to as standard floral scroll for the purpose of this study; however, it was identified as tiger lily motif by Frank. Frank stated that tiger lily motif was an innovation of the Kangxi period and was restricted to export wares during that time. There was no other mention, identification, or discussion of this scroll in any of the other literature; however, it was observed on several examples (Jorg & Flecker; Mudge; Valenstein, 1989). The example most similar to the Dubé Collection tiger lily scroll was a hookah base provided by Valenstein (1989)—the scroll was identical to the Dubé Collection tiger lily (p. 224, Figure 217). Valenstein dated this scroll from the late-17<sup>th</sup> to the early 18<sup>th</sup> century.

The above-mentioned attributes and types fall within, or after than the later portion of the visually interpreted date range, and very strongly support the mean ceramic date of 1686, as well as both shipwrecks, the *Santo Cristo de Burgos* (1693) and the *San Francisco Xavier* (1705), proposed by Williams (2006) to be the source of the porcelain deposition. These attributes and porcelain types, coupled with the Batavian ware, grooved footrim, beveled footrim, glazed bases, and globular boxes used in the calculation of the mean ceramic date and visually interpreted date range, are all heavily indicative of a date of manufacture during the Kangxi reign.

What is interesting, however, is that these dates are nearly 40 years later than the radiocarbon dates (AD 1520-1635) and Erlandson et al.'s (2001) refined date range of 1620-1650 (Williams). More so, there are several attributes among the Dubé Collection sherds that date more closely to the radiocarbon dates than they do to the mean ceramic date or the proposed shipwreck dates. Among the attributes associated with earlier dates, and the earlier portion of the visually interpreted date range (1650-1700), was the peach motif. Although traditional, it was popular in the Daoist reign of Jiajing (1522-1566) (Lion-Goldschmidt, 1978), as well as in the Shunzhi (1644-1661) reign (Bai, 2002). Another indication of Shunzhi reign porcelain is the translation of Sherd NH482, which is a reference to “the Beautiful Jade” (P. Wang, personal communication, April 17, 2008). References to jade, specifically the Jade Hall, were often seen during the Shunzhi reign (Curtis, 2002, p. 42). Two variations of floral scroll, the blobby floral scroll (1650-1660) (Butler, 2002, p. 18, Figure 3), and the boneless floral scroll (1465-1487) (Frank, 1969), are also indicative of early dates. The classic scroll similar to that of the 14<sup>th</sup>-century, and Wanli reign classic scroll was also identified, and remain the few identified attributes outside of the visually interpreted date range. Considering these attributes along with the presence of *kraak* porcelain, zigzag borders, stonewall borders, and use of blobby dots, which were used in the mean ceramic date calculation and the date range determination, it is apparent that there is also a population among the Dubé Collection sherds that suggest an earlier date, possibly during the Shunzhi reign.

There were a few attributes that were left out of earlier discussion because they were worth exploring in more depth. Brown-rim dressing is such an attribute. Observed on 23 of the Dubé Collection sherds, it is an interesting feature in that it had periods of popularity and of absence. Brown-rim dressing was popular from 1620-1660, first on Japanese export, and later,

on Chinese export. After that, there was a period of absence during the early Kangxi reign before it came back into vogue around 1700 (Butler, 2002, p. 23). Being that there was both a presence and absence of brown-rim dressing on the Dubé Collection sherds, the visually interpreted date range is correct. If one or the other had been excluded, the date range could have been narrowed, but since both attributes were present, the date range remained unaffected.

Glaze, as an attribute, was left out of the mean ceramic date and date range determination due to conflicting information—this was unfortunate as it likely would have provided a narrower date range. Green glaze was seen on a majority of the Dubé Collection sherds, and variations of green-glaze attributes can be traced through time. In the case of the Dubé Collection, most Ming types of glaze were ruled out as they did not match the smooth, unobstructive type of glaze observed on the sherds (Frank, 1969). It was more likely that the glaze of the Dubé Collection sherds belonged to the Transitional period or Kangxi reign. This was in agreement with the visually interpreted date range of 1650-1700. However, there was disagreement between sources over the nature of the various phases of Kangxi reign glazes. Both Frank (1969) and Kerr (1986) suggested that Kangxi reign glaze was white or clear. Kerr further defined this by stating that mid-Kangxi export glaze, generally accepted to be dated between 1683 and 1710 (Macintosh, 1977), was white in contrast to the early period blue or green tone. If this indeed were the case, the date range of the Dubé Collection would be reduced to 1650 to 1683 by means of glaze attributes. However, Macintosh provided information that directly contradicted that presented by Kerr. He stated that the mid-Kangxi glaze (1683-1710) was, at times, blue or green. Unfortunately, there was no one source that could disprove the other on this matter, and so, for the time being, the evidence regarding glaze has remained inconclusive.

Although analysis of cobalt tones used in the Dubé Collection varied, it was notable that the majority are of a blue-violet or violet tone typically associated with the Transitional period (1620-1683) and the early Kangxi (1662-1683). However, due to the subjective nature of color determination of the cobalt used, and lack of resources that agreed to date and color, cobalt was omitted from the mean ceramic date and date range determination. Similarly, several border motifs identified, such as imbricated triangles, juxtaposed lozenge/trellis, key fret, and trefoils experienced such a long history of use, their presence did not provide any further clarification of date.

Although many of the attributes discussed above in the body of this text were not included in the visual interpretation of attributes, it is important to note that most of the dateable attributes fell within the date range suggested by the model, 1650-1700. There were only three exceptions that corresponded to a pre-1640 date: a cobalt tone suggestive of the Chenghua (1465-1487), classic scroll similar to that of the 14<sup>th</sup> century, and Wanli (1573-1620) reign classic scroll. However, this was a relatively minor issue as motifs were reused and older styles imitated in later reigns, especially in the case of classic scrolls. In addition, as noted by Goldschmidt (1978), cobalt varied greatly due to firing methods, as well as other factors, and should not be considered overly indicative of date. Regardless, it would not be unlikely to see Chenghua reign features within the date range 1650-1700 as porcelain from that period was imitated during that time (Frank, 1969).

In summary, attributes and porcelain types of the Dubé Collection produced a mean ceramic date of 1686. In addition, a visually interpreted date range of 1650-1700 was generated following South's (2002) model. In reinterpreting the visual analysis chart by way of creating two separate time periods, two nonoverlapping date ranges were generated: 1645-1660 and 1675-1700. The mean ceramic date, being a weighted average, suggested that the great majority of sherds have attributes that correspond to the later portion of the visually interpreted date range. However, the smaller frequency of earlier porcelain attributes corroborated the radiocarbon dates and Erlandson et al.'s (2001) suggested date range some 40 years earlier.

After consideration of the data generated by the analyses, it is apparent that the majority of porcelain sherds strongly indicate a Kangxi reign date (1662-1722) roughly between the early Kangxi and the 1690s. It is not likely that the shipwreck responsible for the deposition of the porcelain dated later than the 1690s, as many attributes present in the Dubé Collection, such as grooved footrims, and the use of symbols and hallmarks, did not extend beyond that period. Furthermore, many later-Kangxi attributes are absent, such as hashed lines in place of wash, and more complicated borders motifs. This strongly suggests that the 1693 wreck of the *Santo Cristo de Burgos* is indeed a likely candidate for the offshore wreck responsible for the porcelain deposition—the *San Francisco Xavier* (1705) having been ruled out, as its date falls outside the visually interpreted date range and is far later than the mean ceramic date.

The smaller number of porcelain sherds with early attributes remain somewhat unexplained. It is possible that a Kangxi reign ship would have been transporting a few earlier period wares purchased as antiques, or perhaps belonging to a private collection of passengers or crew on board. Furthermore, similar finds are not uncommon among shipwrecks. Often during the excavation and analysis of shipwreck porcelain cargoes, porcelain has been discovered that does not fit the time period of the shipwreck, or the time period suggested by the bulk of the porcelain cargo (Sheaf & Kilburn, 1988). They have, in large part, simply been considered anomalies.

There may be a simpler explanation to the discovery of earlier attributes among the Dubé Collection. The appearance of a few earlier porcelain sherds among a collection of later sherds may simply reflect a lack of information regarding export porcelain during the late-Transitional period and early Kangxi reign—this is highly likely. It is tempting when studying Chinese export porcelain to define ware types and motifs with exact dates; however, this study has shown that very few Chinese porcelain attribute dates are known for certain, or agreed upon among the existing literature. Many unknowns remain, and it is quite possible that many of the attributes considered to be early attributes in this study may have coexisted with the later attributes. It is also possible that the earlier attributes and the later attributes represent two separate shipwrecks, one occurring closer to the radiocarbon dates obtained from the Beeswax Wreck (1620-1635) and Erlandson et al.'s (2001) refined time frame (1620-1650), and the other occurring closer in time to the mean ceramic date of the Dubé Collection sherds, and the dates of the missing galleons suggested by Williams (2006).

## DISCUSSION

The distribution of the porcelain may provide evidence as to the location of the shipwreck or to the dispersion of the porcelain over the coastline. It is apparent from measurements taken of the Dubé Collection that thicker sherds tended to be located at Oswald West State Park, while thinner sherds with more delicate features tended to be concentrated at Nehalem Bay. Additionally, the vast majority of the more thickly potted monochrome-white porcelain was concentrated at Oswald West State Park. It is tempting to suggest that this is simply the result of the difference of preservation and protection provided by the two locations. If so, Oswald West State Park would have produced more bases and thicker vessel portions because the erosive conditions did not support the survival of thinner more delicate sherds, while the protective mudflats of Nehalem Bay did. However, this does not explain the overall scarcity of base sherds from Nehalem Bay. It seems that if the differences between the two locations were simply a matter of protection and preservation, then one should find intact bases at Nehalem Bay as well as rim sherds. But that was not the case. The majority of Nehalem Bay sherds were thin body sherds and rim sherds.

J. Dubé (personal communication, May 6, 2008) suggested, based on his knowledge of the local environment and his experience in other archaeological projects, that it is likely that the distribution of sherds is a product of the porcelain being sorted by offshore currents. If this is indeed the case, the porcelain has been sorted in a more or less southeasterly direction, which is also the direction of the offshore current for most of the year (J. Dubé, personal communication, May 6, 2008). This strongly suggests that the shipwreck, or at least a great deal of the porcelain cargo, lies further to the north than historically reported.

The largest pieces of the Dubé Collection were also found at Nehalem Bay; however, in different depositional context than the small rim sherds, which were often found in mudflat areas. The larger sherds were often found wedged between rock cobbles that protected them from the erosive forces of the coastline. The rock cobble, according to Williams (2006), may be evidence of the tsunami that struck the Oregon Coast in 1700. If this is the case, then it would have been necessary for the porcelain to have predated the tsunami, furthering evidence that the origin of the porcelain is the 1693 wreck of the *Santo Cristo de Burgos*.

Woodward (1986), Scheans and Stenger (1990), and Beals and Steele (1981) examined porcelain that was, for the most part, recovered from Native American habitation areas. The porcelain sherds were usually larger, more well preserved, and often had different motifs than those found on the shoreline. While Scheans and Stenger suggested that the differences between porcelain found at various village sites indicate two separate intended markets, this is not likely the case. The differences found between village sites are more likely evidence of human curation of porcelain, perhaps selection of vessel types that were more useful, easier to work into tools, or simply had motifs that, for whatever reason, were more appealing to local people. It might sound outlandish that Chinese motifs would appeal to the aboriginal peoples of Oregon, but it is not altogether unbelievable when one considers that many human-figure motifs were found among village sites.

Much speculation has been made regarding the nationality of the shipwreck. As stated earlier, Scheans and Stenger (1990) suggested that the porcelain cargo was intended for two separate markets, one Asian, one European. This is unlikely. The Dubé Collection is consistent with European export porcelain. Monochrome porcelain, likely from the Dehua kilns, included ribbed and molded porcelain, Marco Polo Censures, Batavian ware, *kraak* porcelain, and a sherd with a European face—all strong indicators of European export. In addition, the wide flat rims, or *klapmutsen*-style rims identified among the Dubé Collection sherds are indicative of European markets, as large, wide rims were designed for condiment use in the formal dining atmosphere of European culture, and were never seen in wares made for Chinese or Japanese use (Honey, 1927).

Woodward's (1986) study suggested that the porcelain is Chinese in origin and possibly bound for export to Japan. He proposed that the majority of evidence pointed to a Portuguese East Indiaman enroute to Japan, drifting in ocean currents and wrecking off the Oregon Coast between 1630 and 1680. While he focused on historic accounts as well as porcelain analysis, his argument for Japanese import was largely based on the presence of brown-rim dressing. However, Butler (2002, p. 23) determined that brown-rim dressing on Chinese export porcelain for Japanese markets was limited to the Chongzhen reign (1628-1644) on polychrome porcelain. This is inconsistent with the majority of Woodward's suggested date range of 1630-1680.

Woodward (1986) further based Japanese import connections on specific sherds: Two were rim sherds and, judging from the sketches, one had a medallion with juxtaposed lozenge/trellis border—the other an unknown, possibly floral motif. Woodward attributed these to *Shonzui* porcelain, a Chinese export to Japan that utilized complicated and busy patterns taken from Japanese textiles (Valenstein, 1989) manufactured between 1628 and 1661. The third sherd by which he justified a Japanese import connection was the underglaze blue with red overglaze and gold foil motif recovered from Site 35-TI-4, noting a production for export to Japan during the 1522-1619 time period. In addition, he noted the sherd with the Chenghua mark (1465-1487) as common among Japanese import markets during the reign of Chongzhen (1628-1644). He acknowledged several historic facts as well, including the discovery of two Japanese vessels discovered in 1820 and 1847 that were carrying beeswax.

Despite this evidence, there are problems with Woodward's (1986) Japanese theory. He proposed a date for the ware between 1630 and 1680; however, the majority of the features that led Woodward to conclude a Japanese market connection occurred before his suggested date range: he noted *Shonzui* porcelain (1628-1661), red overglaze with gold foil exported to Japan (1522-1619), and Chenghua marks on Japanese import (1628-1643) (Woodward, 1986).

In addition, during the majority of Woodward's (1986) suggested time frame of 1630-1680, kilns at Jingdezhen were no longer producing export porcelain, having suspended production in 1657 (Harrison, 1995). In fact, Chinese exports during this period declined to such a great degree that, from 1662 to 1682, Japanese exports were only 1.2% of the total exported between 1602 and 1644 (Rawski, 2002, p. 34). While Chinese exports declined from 1602 to 1682, the opposite was true for Japanese exports—the Japanese wares of Artia actually

*replaced* Chinese wares on the export markets (Harrison) and were exported to China as well (Rawski). Furthermore, McElney (2006) noted that after 1650, import of Chinese porcelain to Japan ceased. Given Woodward's 1630-1680 date range, and comparing it to the export information provided above, this allows only 27 years (from Woodward's early date of 1630 to 1657 when the Jingdezhen kilns closed) at the beginning of that range, and 2 years (Woodward's late date of 1680 to 1682 when Jingdezhen reopened) at the end of the date range, where it would have been likely to have seen a heavily loaded vessel exporting Chinese goods to Japan—and even then, Chinese export had so declined it may not have been possible. While some Chinese wares were being produced by local kilns for export, it was more likely during this time period to have seen more porcelain leaving Japan than entering it.

Williams (2006) proposed that the shipwreck, thought to be the source of the Oregon Coast porcelain, is Spanish. Findings among the Dubé Collection, though few, support this. Monochrome-white porcelain was exceptionally popular among Spanish exports and has been documented in great quantity in Mexican excavation sites (Mudge, 1986), as well as Port Royal, Jamaica (Bass, 2005). Lidded cups identified among the Dubé Collection sherds were commonly used for coffee and chocolate drinking among Europeans, and this did not become popular in Europe until after 1700 (Mudge). However, for the Spanish of New Spain, coffee drinking was enjoyed much earlier and was well established by 1690 (Mudge), therefore the inclusion of lidded cups on a pre-1700 shipwreck is highly indicative of a New Spain market. Among the Spanish, Middle-Eastern-influenced porcelain motifs were also popular (Mudge). This was observed among the Dubé Collection as well, in the form of foliated rims, irregular peony scroll similar to that found on the Sadana Island wreck (Bass), including *kraak* porcelain, which is believed to have resonated with the Spanish because of its busy, Middle-Eastern-like motifs (Mudge).

Furthermore, the suggested date of the Dubé Collection coincide with a period of peak Manila galleon export during the late-17<sup>th</sup> century, having recovered from a depression in the Spanish economy originating from the 1620s (Mudge). The silver oleum jar, discovered offshore near Nehalem, also provides a clue as to the nationality of the shipwreck. The jar was identified as a specific vessel style used in Catholic ceremonies during the 17<sup>th</sup> century, and would have likely been aboard a Spanish ship of that period (Williams, 2006). This evidence, coupled with the presence of beeswax throughout the geographic region in which the porcelain was found, provides a strong indication of a Spanish vessel, as the Spanish were importing large quantities of beeswax into New Spain (Williams).

Unfortunately, the sherds studied by Beals and Steele (1981) and Woodward (1986) were not available for comparison to the Dubé Collection; however, it was apparent from descriptions, sketches, and photographs provided by Beals & Steele, as well as Woodward, that the Netarts Spit, Nehalem Bay, and Dubé Collection were contemporary, in some cases, having identical motifs and vessel types. While some of Beals & Steele's findings were inconclusive, the 1573-1722 date range they suggested, though rather wide, support the Dubé Collection findings. They concluded that the majority of test results indicated manufacture between the Wanli (1573-1620) and the Kangxi (1662-1722).

Netarts Bay sherds were identified as having brown rims and *Prunus* motifs, figurative motifs, as well as zigzag borders. If, indeed, the border pattern was zigzag, the motif could be dateable from the 1640s to about 1675 (Butler, 2002, p. 23). However, upon inspection of the photographs provided by Beals and Steele (1981, Plate I), the border pattern appeared closer to the imbricated triangle motif noted in this study, which had been used to decorate Chinese porcelain since the Yuan dynasty (1260-1368) (Lion-Goldschmidt, 1978), and was seen in great numbers among the cargo of the *Vung Tau* (1690) (Jorg & Flecker, 2001), as well as the *Ca Mau* (1723-1735) (Chiến, 2002), and the *Geldermalsen* (1752) shipwrecks (Sheaf & Kilburn, 1988).

Floral underglaze patterns were also identified as being either lotus or peony scroll in the Netarts collection; however, Beals and Steele (1981) remained inconclusive in the absence of a blossom on the sherds. Based on the sketch provided (Figure 4, p. 9), as well as photographs provided (Plate I, Figure d, p. 31), the floral scroll of the Netarts Spit sherds was identical to the standard floral scroll, or tiger lily scroll, observed in rather large quantity among the Dubé Collection. It must be noted, however, similar scroll was also seen associated with a peony flower on Sherd NB0001.

Beals and Steele (1981) identified a single grooved footrim among the Netarts sherds that they determined to be from the Wanli (1573-1620) period based on the sherd's glaze and potting. Again, the sherd was not available for study; however, based on the photographs (Beals & Steele, Plate II, Figure c, p. 33), the groove appeared to be extremely narrow and it was difficult, because of the quality of the photograph, to accurately compare the groove to those of the Dubé Collection sherds. There were some narrow grooved footrims observed in the Dubé Collection, as well as a base with a well developed grooved footrim. Fully developed grooved footrims were an attribute of porcelain produced during the reign of Kangxi (1662-1722); however, small or embryonic grooves or channels were observed during the reign of Shunzhi (1644-1661) when the grooved footrim was thought to have originated (Butler, 2002, p. 22). Therefore, despite the condition of the glaze that led to a Wanli date by Beals and Steele, a grooved footrim, especially if narrow, would be more accurately attributed to the Shunzhi reign.

Similar to the Dubé Collection red-overglaze sherds, a number of underglaze blue with red overglaze and gold foil were identified in the Netarts collection. Beals and Steele (1981) did not provide any conclusive dates for these sherds. They merely noted two features which provided contradictory dates: the red overglaze brush style typical of the Kangxi and the gold foil typical of the Ming.

Similarly, the results of the manganese/cobalt ratio test and the element analysis test conducted by Beals and Steele (1981) at times contradicted one another and contradicted the analysis of visual attributes. In addition, test results seemed to be heavily indicative of a Ming dynasty date while many visual attributes suggested later periods. These results were considered carefully during this study as they are likely indicative of a lack of information rather than a true date. Very few tests have been done regarding the elemental make up of Qing samples (Beals & Steele). And, if information on which the research was based was correct, it seems as though one



of the three testing methods should have confirmed the other's findings. Vessels cannot have the motif of a Kangxi reign porcelain vessel, the glaze of a Wanli vessel, and the cobalt of the Ming dynasty. Therefore, the tests results are highly indicative of a lack of information and a lack of previous testing conducted on vessels that date to a period from which the porcelain actually belonged.

The porcelain collection analyzed by Woodward (1986) was similar to that described by Beals and Steele (1981). He proposed a date for the collection from 1630 to 1680, during the Transitional period. In addition, he attributed several features to the early Kangxi reign, with fewer examples of features that might have indicated Ming dynasty dates. Unfortunately, Woodward was brief when discussing the porcelain which generated the Ming dynasty dates, only noting what was possibly a *kraak* porcelain sherd and a polychrome sherd. The remainder of Ming dynasty dates suggested were not accompanied by any descriptions, and, therefore, cannot be addressed here.

Although the majority of the sherds analyzed by Woodward (1986) were no longer available for study, a few sketches provided did allow for comparison of motifs and features to the Dubé Collection. Among the sherds described by Woodward were molded foliated rim sherds and rim sherds with brown-rim dressing. In addition, he noted floral-scroll sherds likely from cups with lid ledges on the interiors, landscape elements, Buddhist Eight Happy Omens, Dehua type monochrome bowls or cups, lidded cups, Marco Polo Censure sherds, a Quan Yin figure's base, compressed globular boxes with molded chrysanthemum motifs on the lids, and cracked-ice or stonewall border motifs. These were also identified among the Dubé Collection, although the chrysanthemum motif was not intact on the globular box sherds.

Additionally, Woodward (1986) identified a motif (Plate 225) that he called *feathery flower motif*. This was identical to the floral scroll so commonly seen in the Dubé Collection, and later identified as tiger lily which Frank (1969) attributed to Kangxi export porcelain. Additionally, Woodward identified stonewall or cracked-ice borders among the sherds recovered from 35-TI-4. The stonewall border has long been considered an indication of early Kangxi porcelain; however, recent studies (Butler, 2002, p. 23) revealed that the stonewall or cracked-ice border may, in fact, be indicative of the often overlooked Shunzhi reign.

Another feature Woodward (1986) noted as indicative of the Kangxi reign included the presence of the Chenghua mark. Although the mark was not observed among the Dubé Collection sherds, it was observed in the Netarts Bay Site 35-TI-1. Beals and Steele (1981), as well as Woodward noted calligraphy of the Chenghua *nien-hao* indicated a Kangxi reign date (Beals & Steele; Woodward). According to Mudge (1986), the Chenghua mark was indeed mimicked, as were Chenghua design elements, during the Kangxi reign. Woodward further noted sherds that he stated were *Shonzui* porcelain (Woodward), a Chinese export produced for the Japanese market (Valenstein, 1989).

## CONCLUSION

It is apparent from descriptions, sketches, and photographs provided by Beals and Steele (1981) and Woodward (1986) that the Netarts, Nehalem, and Dubé Collection are contemporary, in some cases having identical motifs and vessel types. While some of Beals and Steele's findings were inconclusive, their suggested date range 1573-1722 supports the Dubé Collection findings. In addition, Woodward's (1986) suggested date range of 1630-1680 closely matches that of the visual interpretation conducted on the Dubé Collection attributes; however, his conclusion regarding the intended market does not appear historically accurate as Japan was more likely an exporter of porcelain rather than an importer during that time period. In addition, there appears to be no supporting evidence among the Dubé Collection regarding the porcelain being intended for two separate markets as suggested by Scheans and Stenger (1990).

Rather, the Dubé Collection indicates that porcelain attributes and types were fairly equally distributed among locations, most being of export types common among European communities. The presence of monochrome porcelain, likely from the Dehua kilns, including ribbed and molded porcelain, Marco Polo Censures, Batavian ware, and a sherd with a European face, are all indicators of European export. More specifically, large quantities of monochrome-white porcelain, as well as the identification of lidded cups and Middle-Eastern influences among the Dubé Collection sherds, indicate that the ship was likely a Spanish vessel. This supports the finding of Williams' (2006) research which indicated that this was a likely nationality for a shipwreck carrying quantities of beeswax.

Concentration of thicker, heavier sherds at Oswald West State Park, and lighter, finer sherds at Nehalem Bay might be indicative of dispersion of the shipwreck cargo from the northwest to the southeast along the coastline. The high concentration of monochrome-white porcelain at Oswald West State Park, and the general lack of it in the southern locations, also supports this theory, as monochrome-white porcelain tends to be more thickly potted than blue-underglaze porcelain. If this is indeed evidence of cargo dispersion from north to south, then the shipwreck may be further north than is generally historically described.

Some Dubé Collection sherds display early attributes more close in time to the radiocarbon dates of 1520-1635 and Erlandson et al.'s (2001) suggested time frame of 1620-1650, and while the reasons behind this remain unknown, several possible explanations exist. First, it would be expected that the radiocarbon dates predate the time of the shipwreck and deposition of porcelain because of the "built in" age of the wood from which the vessel was constructed. If wood from the center of the tree was used, it could produce a significantly older radiocarbon date than wood from the outer portions of the tree. Additionally, it is possible that a Kangxi reign ship was transporting a few earlier period porcelain pieces or, that the early and late attributes observed among the Dubé Collection sherds represent two separate shipwrecks off the Oregon Coast. However, it is also likely that the appearance of both earlier and later porcelain attributes might more accurately be prescribed to a lack of information regarding export porcelain during the late-Transitional period and early Kangxi.

After consideration of attributes and porcelain types among the Dubé Collection sherds, the visually interpreted date range (1650-1700), and the mean ceramic date (1686), it is apparent that the majority of evidence strongly indicates that the porcelain found on the Nehalem-Manzanita coast is from a Spanish vessel that wrecked during the Kangxi reign, more specifically between the early Kangxi and the 1690s, but no later. The date of the porcelain is not likely later as many later-Kangxi porcelain attributes, such as hashed lines in place of wash, and intricate borders, are absent. Therefore, the identity of the shipwreck responsible for the porcelain deposition is not likely the 1705 wreck of the *San Francisco Xavier*. Rather, analyses conducted in this study strongly indicate that the missing Spanish galleon, the *Santo Christo de Burgos*, lost in 1693, is the source of the porcelain deposition on the Oregon Coast.

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## APPENDIX

### Chronology of Chinese Dynasties and Reigns by Dynasty

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| Reign            | Date (AD) |
|------------------|-----------|
| Ming (1368-1644) |           |
| Hongwu           | 1368-1398 |
| Jianwen          | 1399-1402 |
| Yongle           | 1403-1424 |
| Hongxi           | 1425      |
| Xuande           | 1426-1435 |
| Zhengtong        | 1436-1449 |
| Jingtai          | 1450-1456 |
| Tianshun         | 1457-1464 |
| Chenghua         | 1465-1487 |
| Hongzhi          | 1488-1505 |
| Zhengde          | 1506-1521 |
| Jiajing          | 1522-1566 |
| Longqing         | 1567-1572 |
| Wanli            | 1573-1620 |
| Taichang         | 1620      |
| Tianqi           | 1621-1627 |
| Chongzhen        | 1628-1644 |
| Qing (1644-1911) |           |
| Shunzhi          | 1644-1661 |
| Kangxi           | 1662-1722 |
| Yongzheng        | 1723-1735 |
| Qianlong         | 1736-1795 |
| Jiaqing          | 1796-1820 |
| Daoguang         | 1821-1850 |
| Xianfeng         | 1851-1861 |
| Tongzhi          | 1862-1874 |
| Guangxu          | 1875-1908 |
| Xuantong         | 1909-1911 |

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*Note.* Hanyu Pinyin transliterations were used for dynasty and reign names. Modified from Beals & Steele (1981). Transitional period = 1620-1683 (Mathers et al., 1990). High Transitional Period = 1634-1643 (Butler, 2002).