

Biomass Fuel Availability

Berlin, New Hampshire

Prepared for:

Clean Power Development

May 2008

Innovative Natural Resource Solutions LLC

- Forest industry and land conservation firm based in Keene, NH
 - Office in Portland, Maine
- Significant practice in biomass energy, particularly on wood supply
 - Over 40 biomass fuel supply analysis
 - Around the country
 - Over 20 in New England
- Offer independent view of biomass fuel supply including fuel, infrastructure, challenges, etc.

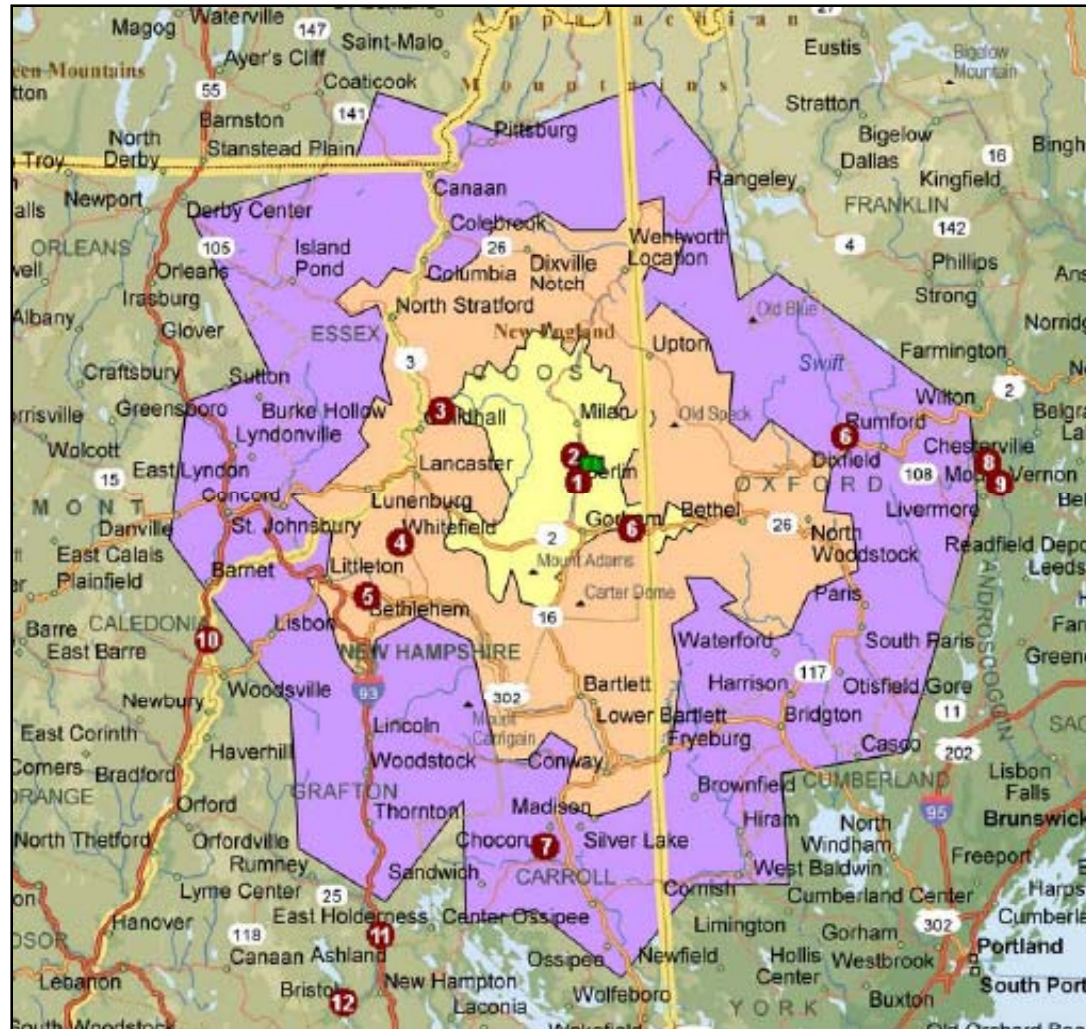


Biomass Supply for Clean Power – Berlin, NH

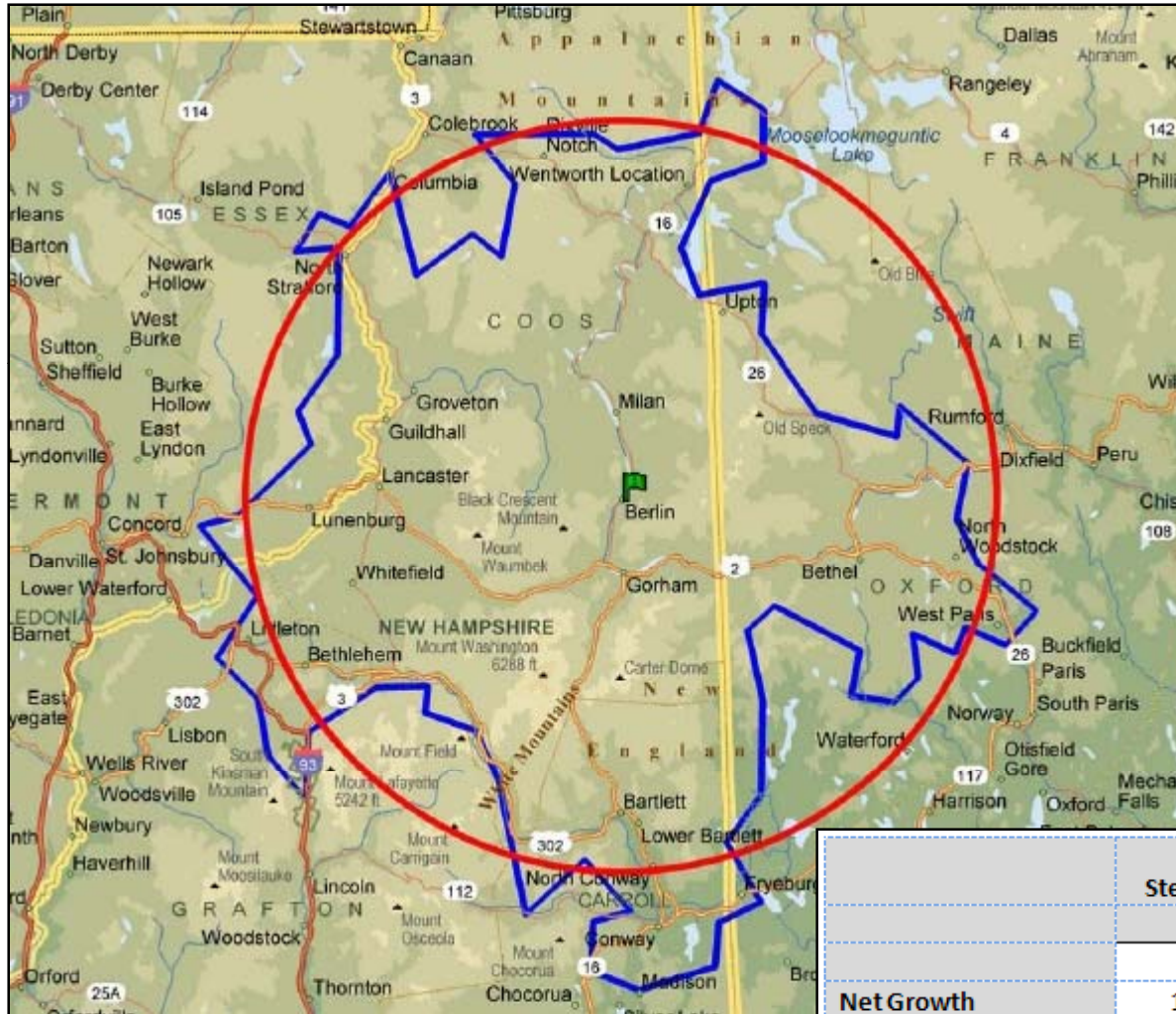
- All existing major markets are expected to continue operations
- Need to secure volume of wood at a given price point
- Desire to limit exposure to diesel price fluctuations
- Biomass secured from local and regional sources – no imports from distant sources



30, 60 and 90 Minute Drive Time



30 mile radius, 60 Minute Drive Time

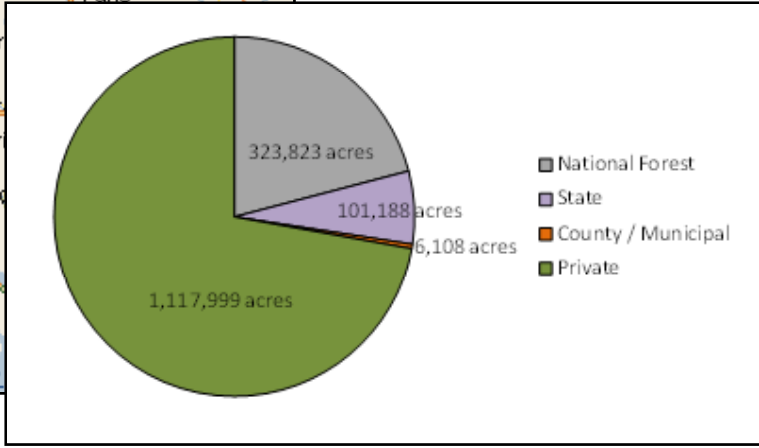
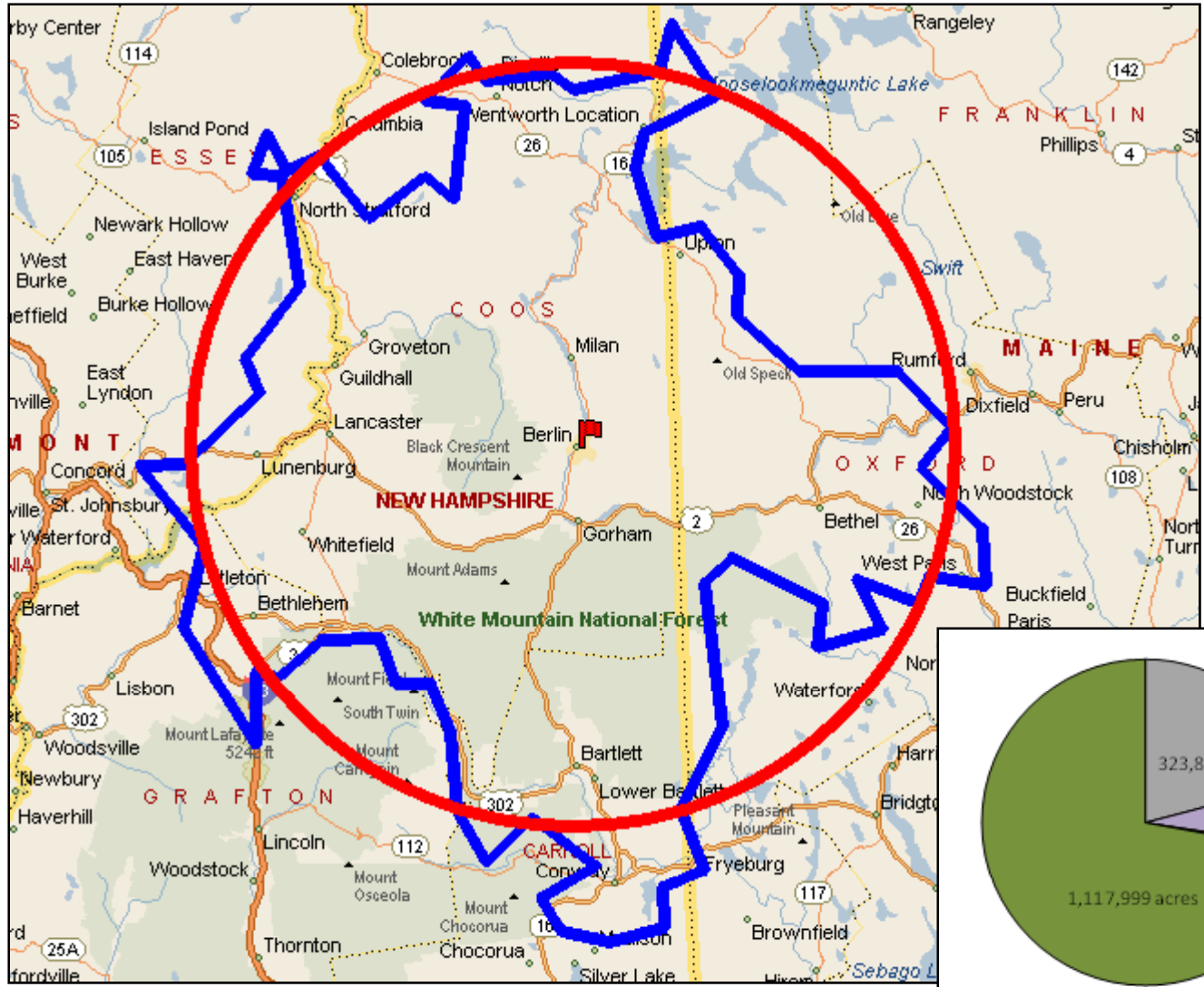


* Growth and Removal Figures exclude Public Lands

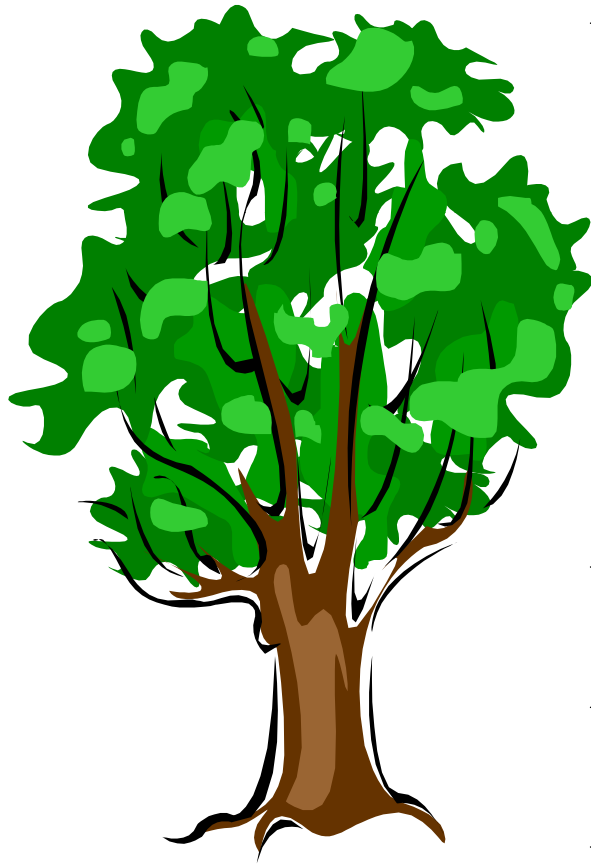
| | Stem Only | Tops / Branches ⁵ | Total |
|----------------------|-------------------------|---------------------------------|-----------|
| | green tons ⁶ | | |
| Net Growth | 1,035,619 | 300,329 | 1,335,948 |
| Removals | 933,308 | 270,659 | 1,203,967 |
| Growth less Removals | 102,311 | 29,670 | 131,981 |



30 mile radius, 60 Minute Drive Time



Products from a Single Tree



Tops and branches –
Chipped for biomass or
mulch, or left in woods

8' to 16' – Depending upon quality and
local markets, sent to sawmill, pulp mill
or chipped

8' to 16' – Saw log – sent to sawmill







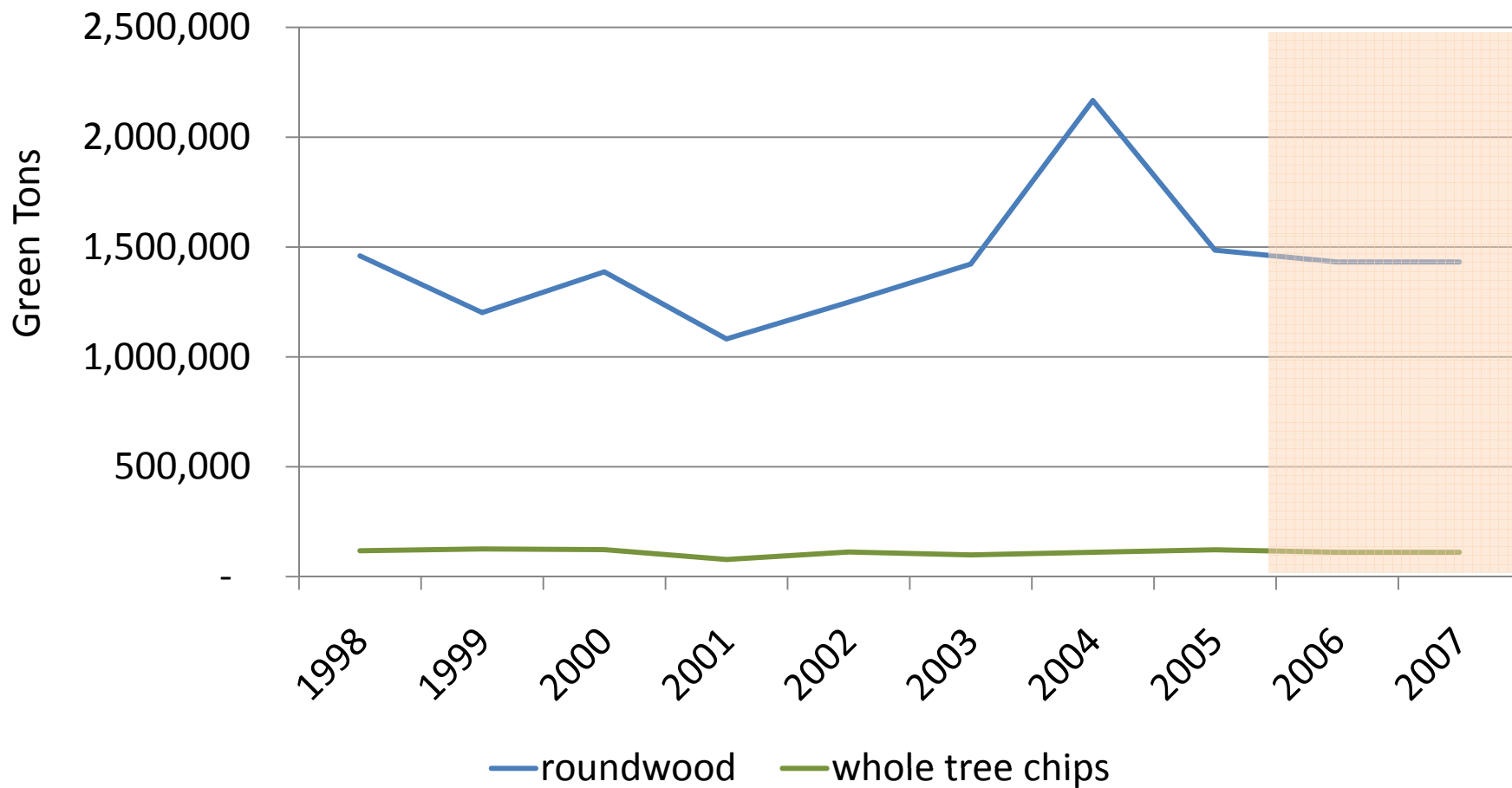


Annual Timber Harvest Volumes by Product, Coos County, 1998 - 2005

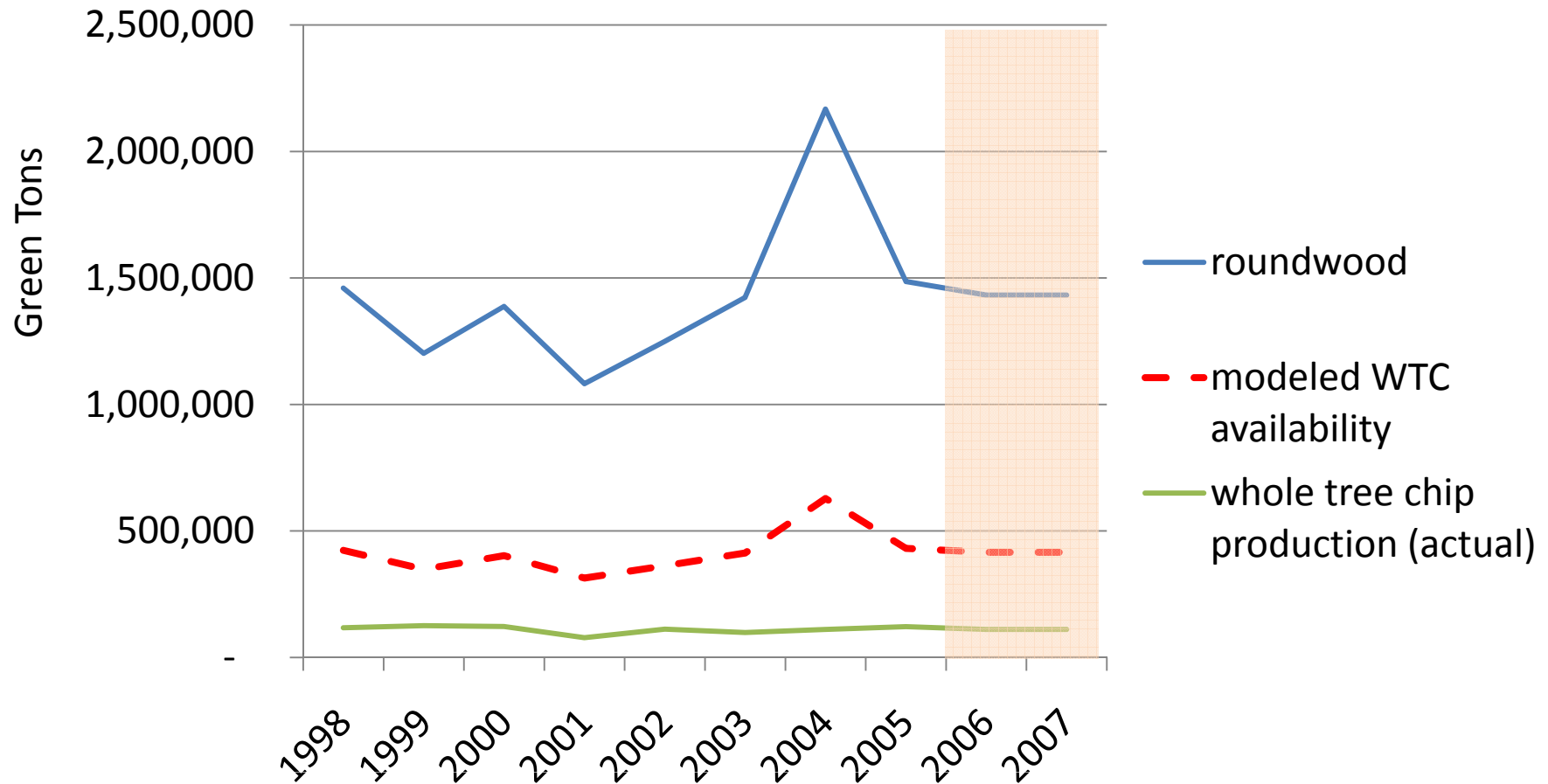
| | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
|-----------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Sawlogs | | | | | | | | |
| White Pine (mbf) | 2,451.3 | 3,405.5 | 2,323.4 | 2,807.1 | 1,773.7 | 3,789.0 | 5,555.4 | 3,743.0 |
| Hemlock (mbf) | 534.7 | 172.7 | 235.2 | 112.2 | 102.5 | 275.3 | 534.4 | 220.0 |
| Red Pine (mbf) | 624.8 | 112.1 | 59.8 | 24.1 | 39.1 | 16.4 | 116.2 | 188.7 |
| Spruce & Fir (mbf) | 24,413.2 | 25,896.7 | 26,520.3 | 24,297.3 | 21,268.1 | 20,454.7 | 31,902.7 | 23,149.4 |
| Hard Maple (mbf) | 7,703.1 | 7,762.9 | 8,493.6 | 5,150.6 | 5,588.2 | 7,327.0 | 9,940.2 | 6,672.5 |
| White Birch (mbf) | 1,168.7 | 1,485.4 | 2,091.7 | 1,014.5 | 1,227.3 | 1,329.4 | 1,705.7 | 1,338.3 |
| Yellow Birch (mbf) | 3,234.3 | 2,912.3 | 3,143.7 | 2,719.9 | 3,434.3 | 3,811.4 | 3,793.2 | 3,432.0 |
| Oak (mbf) | 134.5 | 113.2 | 139.9 | 26.1 | 68.4 | 235.6 | 550.5 | 163.2 |
| Ash (mbf) | 600.8 | 666.5 | 776.6 | 375.9 | 196.6 | 814.3 | 635.9 | 445.5 |
| Beech & Soft Maple (mbf) | 1,295.3 | 1,092.6 | 1,229.9 | 1,057.7 | 1,095.0 | 1,296.1 | 1,927.6 | 1,424.1 |
| Pallet & Tie Logs (mbf) | 5,640.1 | 4,769.9 | 5,105.2 | 3,807.5 | 3,864.3 | 5,128.5 | 7,598.6 | 6,456.4 |
| Other (mbf) | 809.8 | 300.6 | 1,366.2 | 1,106.6 | 302.2 | 377.6 | 816.2 | 177.4 |
| Exempt (mbf) | 67.8 | 95.0 | 40.9 | 106.0 | 87.2 | 39.5 | 88.2 | 130.5 |
| Pulpwood / Low Grade | | | | | | | | |
| Spruce & Fir Tons | 38,150.2 | 26,869.5 | 28,863.4 | 35,923.9 | 26,047.5 | 35,245.0 | 124,357.4 | 29,685.4 |
| Hardwood & Aspen Tons | 294,248.0 | 182,625.8 | 238,041.8 | 192,669.9 | 229,055.0 | 277,019.2 | 429,778.3 | 249,773.5 |
| Pine Tons | 1,465.8 | 2,185.5 | 605.1 | 1,159.8 | 933.1 | 4,543.5 | 6,543.5 | 4,626.7 |
| Hemlock Tons | 866.8 | 343.9 | 812.4 | 188.3 | 127.1 | 2,993.9 | 13,808.7 | 5,065.9 |
| Whole Tree Chips Tons | 70,941.4 | 66,446.0 | 63,173.4 | 35,592.5 | 78,497.9 | 63,133.1 | 87,987.9 | 89,627.4 |
| Spruce & Fir Cords | 18,711.7 | 23,729.9 | 23,715.3 | 16,979.2 | 13,453.4 | 14,248.2 | 9,181.0 | 12,917.4 |
| Hardwood & Aspen Cords | 28,888.4 | 78,701.7 | 78,386.3 | 57,018.7 | 45,440.0 | 43,685.0 | 32,293.5 | 75,175.6 |
| Pine Cords | 1,654.1 | 2,572.8 | 1,761.1 | 1,366.5 | 1,810.9 | 806.7 | 377.4 | 553.7 |
| Hemlock Cords | 615.1 | 1,025.1 | 1,587.9 | 1,025.4 | 681.2 | 677.0 | 1,629.7 | 1,109.8 |
| Whole Tree Chips Cords | 7,113.8 | 8,630.0 | 10,791.9 | 3,859.7 | 1,557.4 | 6,584.4 | 7,902.1 | 14,452.6 |
| Birch Bolts Cords | 2,417.4 | 1,496.4 | 1,181.3 | 2,069.7 | 638.9 | 574.3 | 535.4 | 113.6 |
| Cordwood & Fuelwood Cords | 1,273.0 | 1,782.2 | 2,335.6 | 2,030.9 | 2,536.4 | 3,458.4 | 2,036.8 | 4,646.0 |
| Exempt Cords | 402.8 | 501.0 | 540.5 | 419.0 | 452.0 | 520.5 | 514.0 | 334.0 |



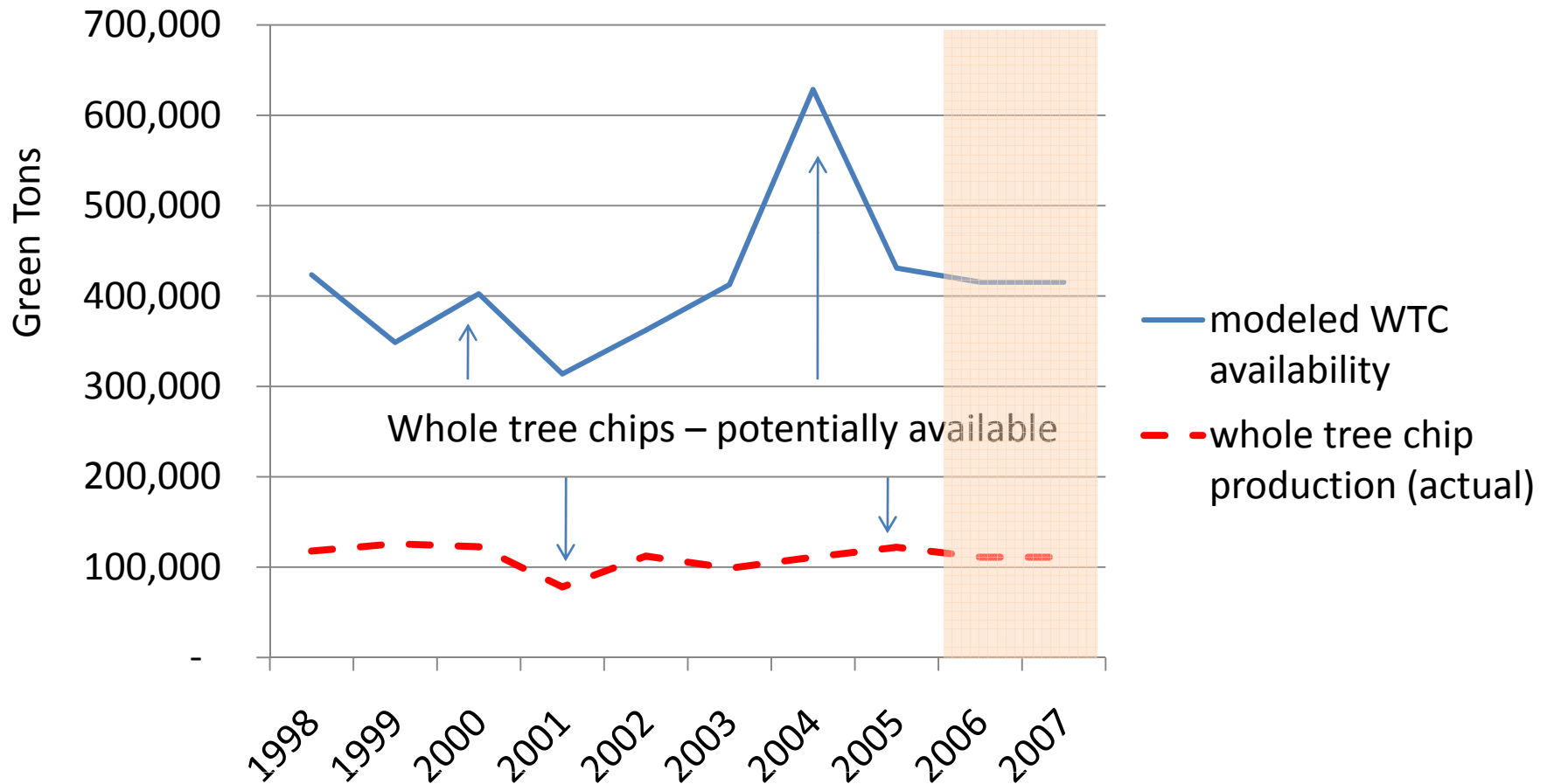
Timber Harvest in Coos County, NH by Product Type, 1998 - 2005



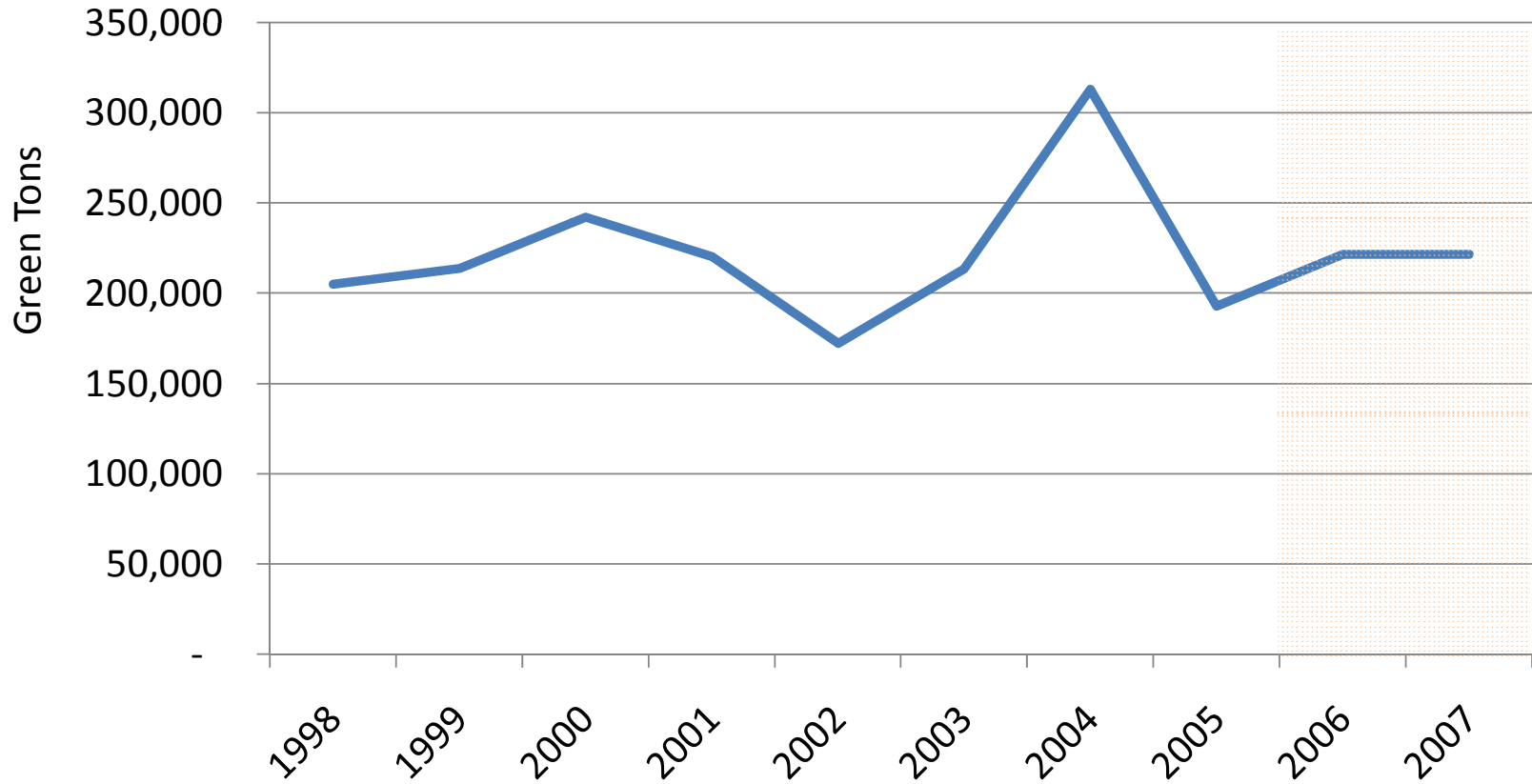
Modeled WTC Availability, Coos County, NH, 1998 - 2005



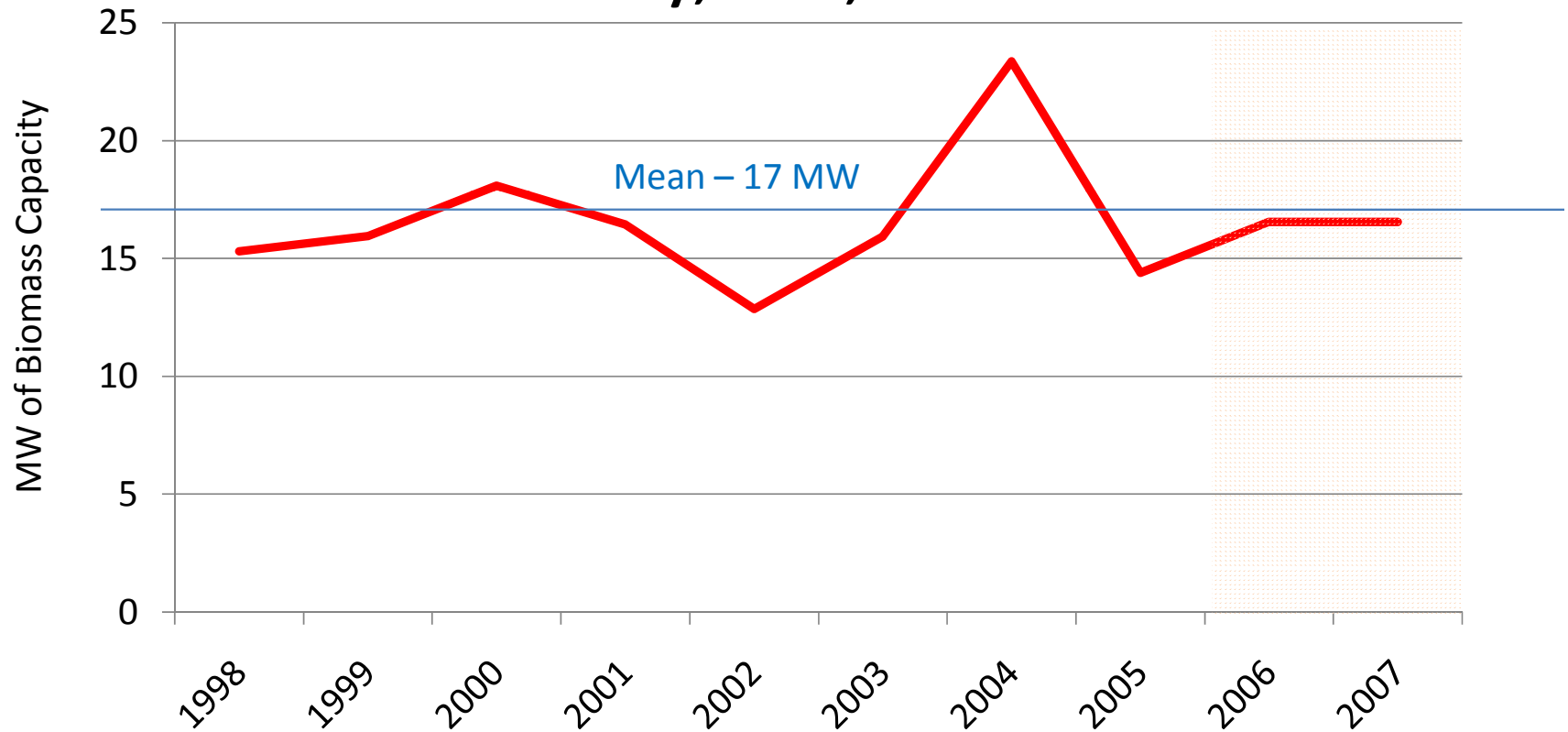
Modeled WTC Availability, Coos County, NH, 1998 - 2005



Potentially Available Whole Tree Chips, Coos County, NH, 1998 - 2005



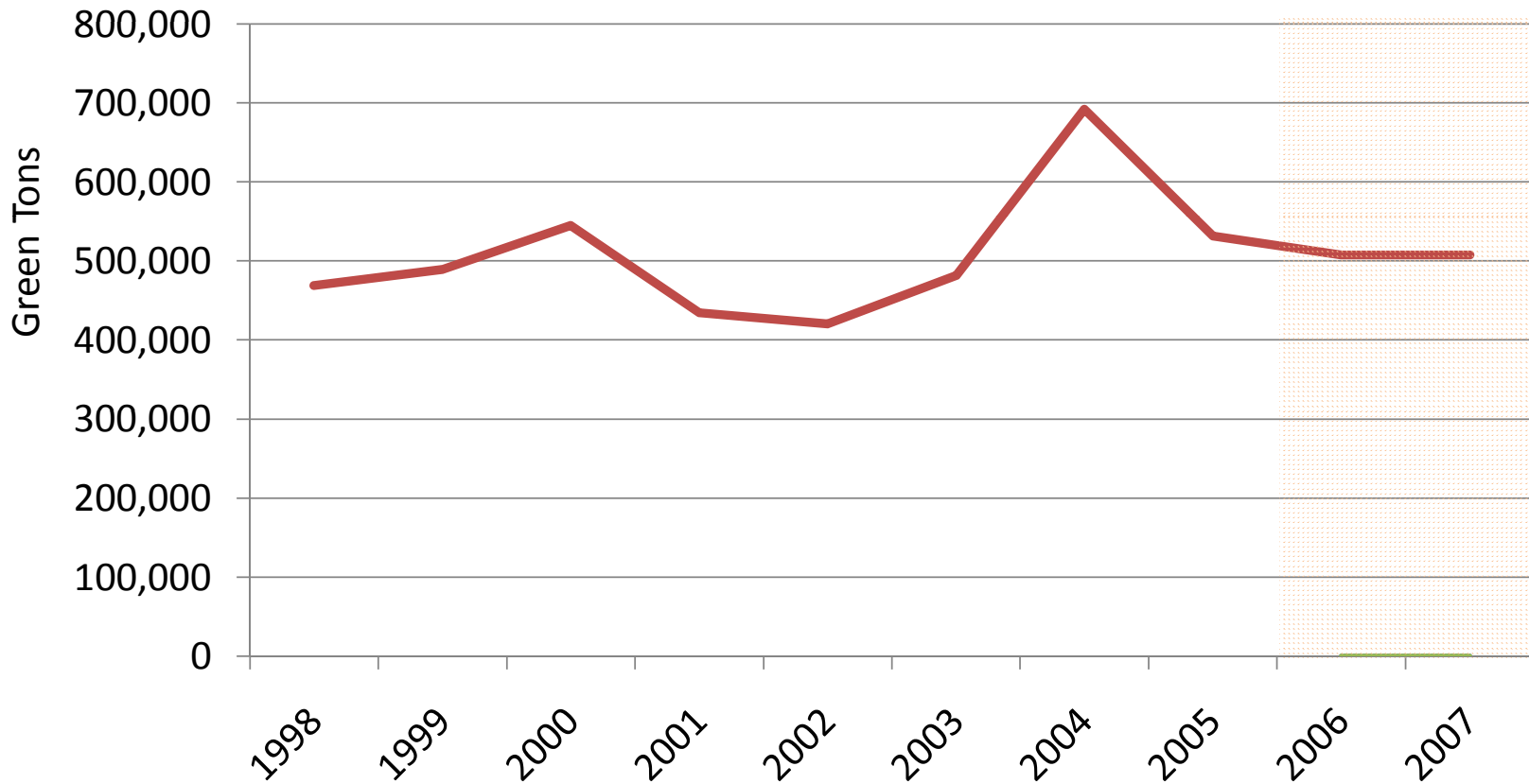
MW Production from Potentially Available Whole Tree Chips, Coos County, NH, 1998 - 2005



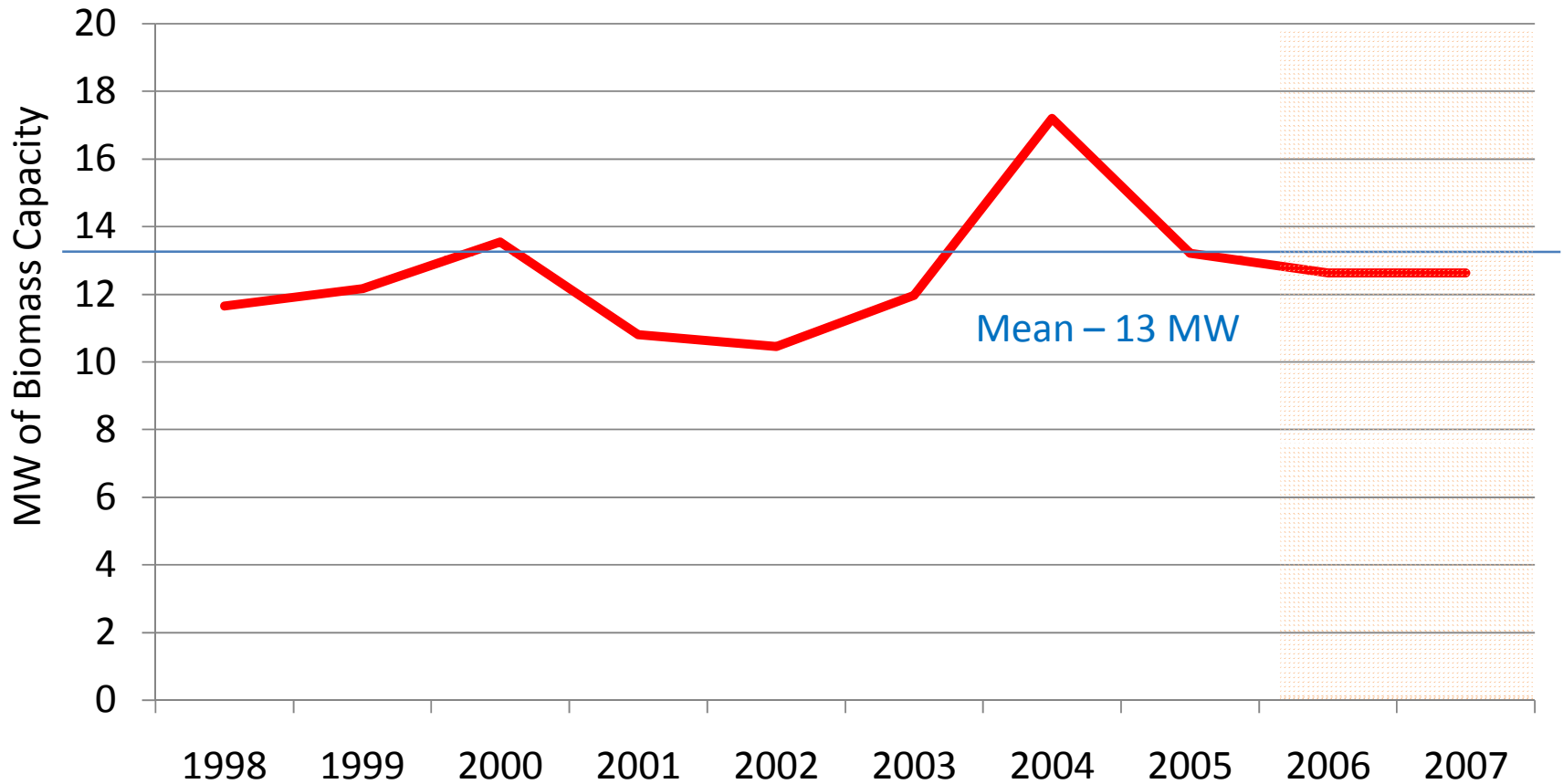
Assumes 1.7 green tons per MWh, 90% capacity factor



Pulpwood Harvest in Coos County, NH 1998 - 2005



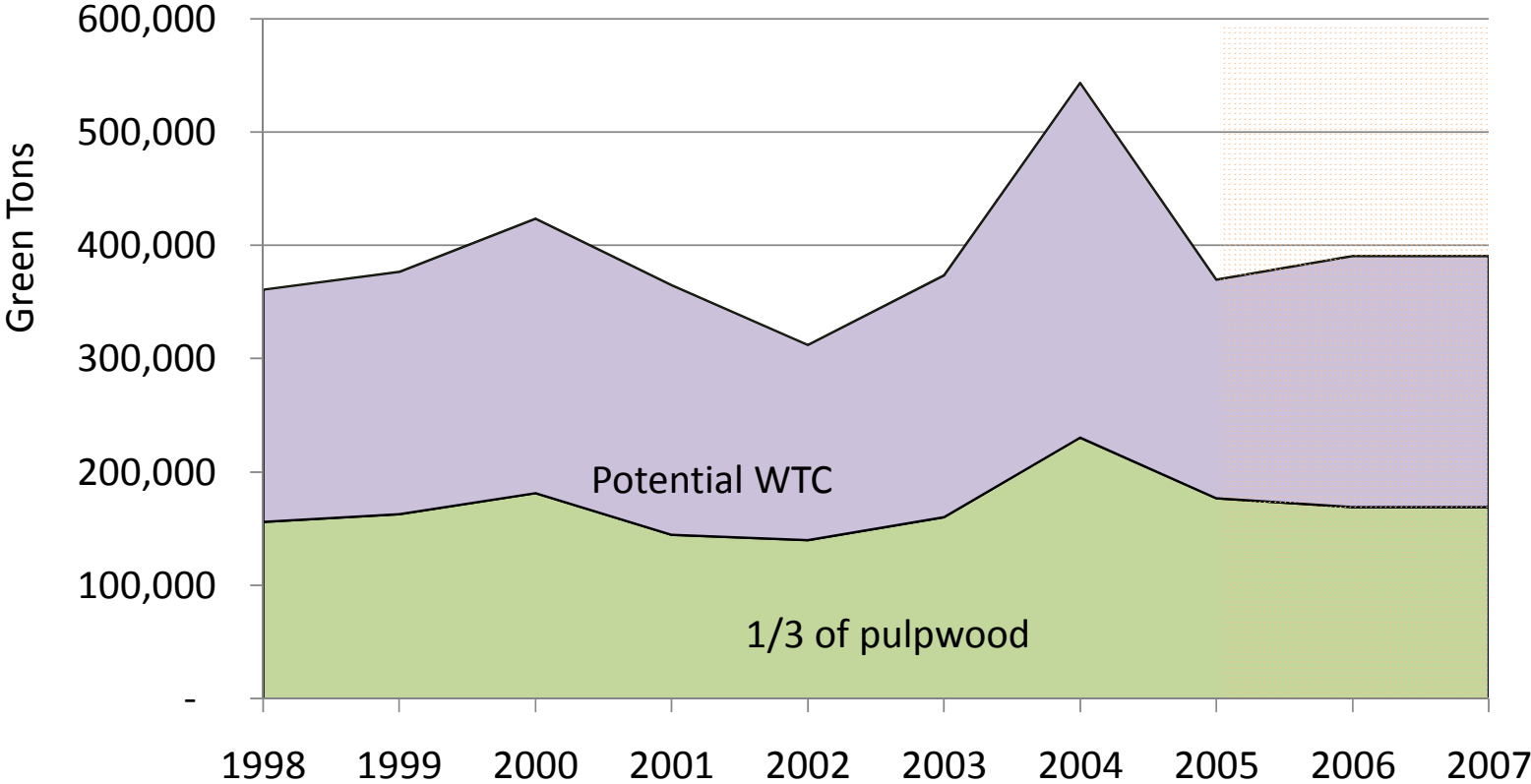
MW Potential from One Third of Pulpwood Harvest in Coos County, NH, 1998 - 2005



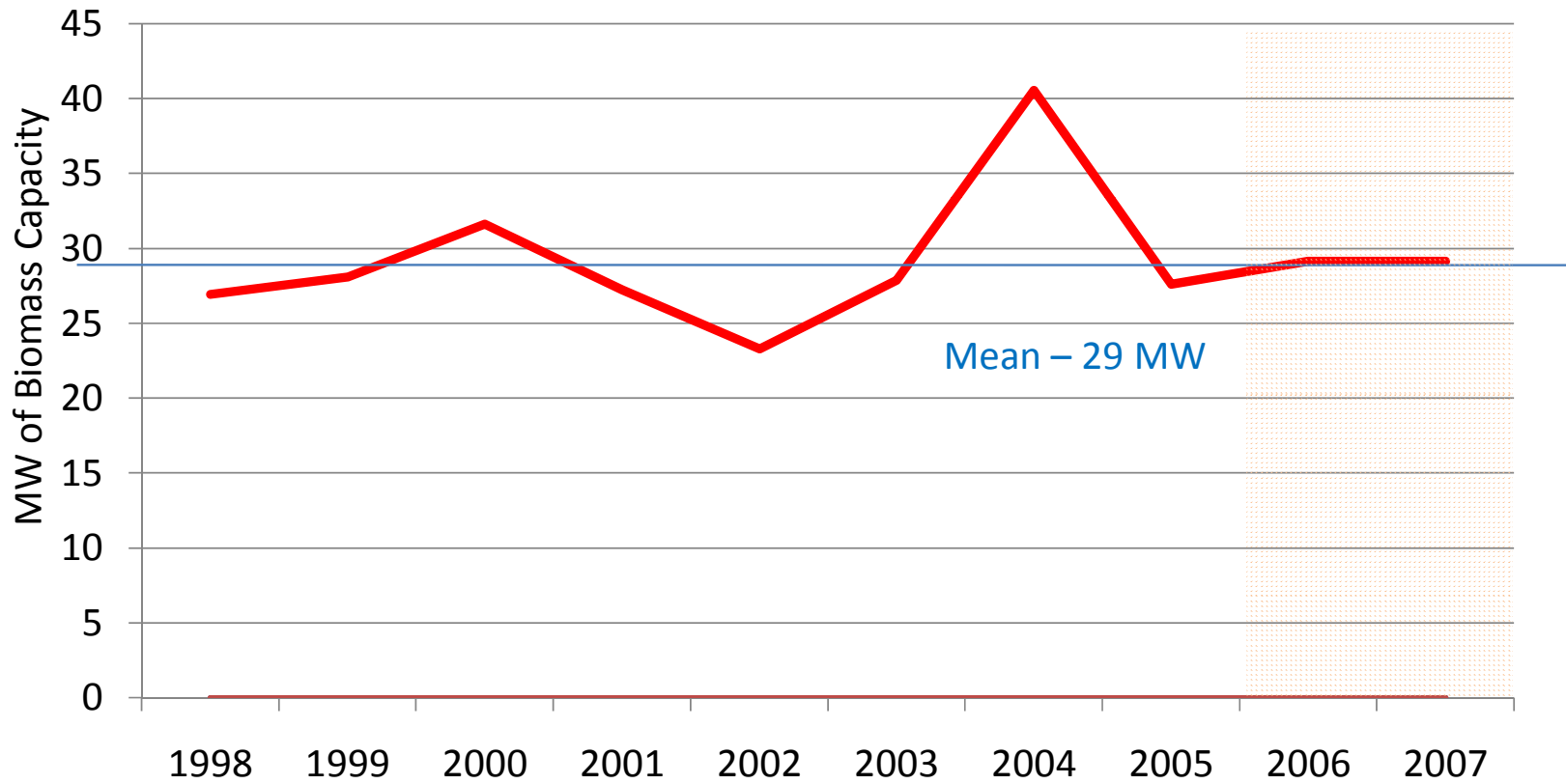
Assumes 1.7 green tons per MWh, 90% capacity factor



Biomass Availability from Incremental WTC Production and 1/3 of Pulpwood Production Coos County, NH, 1998 - 2005



Potential MW Production from Incremental WTC Production *and* 1/3 of Pulpwood Production Coos County, NH, 1998 - 2005



Assumes 1.7 green tons per MWh, 90% capacity factor



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